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An Address.[1]

By H. J. DALY,

Retiring President of the Australian Society of Anæsthetists (British Medical Association), Sydney.

IN addressing you, fellow members, I wish to express my deep appreciation of the honour you have paid me in choosing me as president of this society, which has in the past played and will in the future play an important part in the development of anæsthesia in this country.

At this stage I must refer to the great loss our society has suffered by the death of Basil Diethelm, at the early age of twenty-nine years. He died at his post, for he had just finished giving an anæsthetic when suddenly he collapsed, and he passed away in a few hours without regaining consciousness. He was very brave. He had known for some time that his blood pressure was abnormally high; in fact within a few weeks of his death his eyesight had been affected from retinal hæmorrhages. Yet, despite these warnings, he continued to serve his calling. He was the first to gain the diploma of anæsthesia from the University of Sydney. He held honorary anæsthetist appointments at Saint Vincent's Hospital, the Royal Prince Alfred Hospital and Sydney Hospital. He was a gentle and lovable man who had endeared himself to us all. Condolences were sent from the society to his widow and his family. I would ask you to stand with me and reflect for a moment on the passing of our colleague and friend.

[1] Read at the annual meeting of the Australian Society of Anæsthetists (British Medical Association) on April 15, 1947, at Adelaide.

Another matter to which attention should be drawn is the number of anæsthetists who felt the urge and answered the call to army service, often at great personal and financial loss. Others were disappointed, in that their services were not required, and although they worked hard to keep the standard of anæsthesia at a high level, they yet have a duty, and that is to endeavour to rehabilitate those who have returned.

As you are already aware, the Morton Centenary was celebrated in Boston and London in October, 1946, and on behalf of the society telegraphic greetings were dispatched, wishing them well at their junketings. In Melbourne a meeting was held to mark the occasion, and S. V. Marshall delivered the Morton Centenary Address before a representative gathering which included the Chancellor of the University of Melbourne. This meeting was held in a lecture room adjoining the anæsthetists' museum, and in passing I would mention that we have housed there a collection of which we may well be proud. The collection of exhibits and their arrangement are solely due to the painstaking efforts of Geoffrey Kaye has made, and they will preserve not only for us but for future members of this society all manner of anæsthetic equipment, both ancient and modern. I am sure that you will all agree we should refer to it as "the Geoffrey Kaye Museum".

I now claim the privilege commonly accorded an older member of any society—namely, to delve into the past, and so I shall look back and review some of our activities in the last twenty years.

Prior to 1927 anæsthesia in Australia was a sort of Tom Tiddler's ground, in which anyone could play. Junior physicians and surgeons began to leave the field lest they be fenced in and considered anæsthetists. More articles on anæsthesia began to creep into the medical journals, and men specially interested in this branch of medicine became

vaguely aware of a place for the anæsthetist in the team. Ingenious machines for administering gaseous anæsthetics were coming into Australia from America, and we were all eager to try them. We in Sydney, aware as usual of the minor place we occupy in matters medical, were anxious to meet the big men in anæsthesia from the other States. There were Gilbert Brown of Adelaide, Geoffrey Kaye of Melbourne, and Gilbert Troup of Perth. Our wish was shortly to be gratified, for a section of anæsthesia was to be included in the Australasian Medical Congress (British Medical Association) to be held in Sydney in 1929. The South Australian Branch of the British Medical Association rightly proposed Gilbert Brown as first president of the first section of anæsthesia and he, with Geoffrey Kaye as organizer, arranged a fine programme for the section. It may be interesting to recall the papers and their readers. They were as follows: Presidential address; "Anæsthesia in Lung Surgery", Gilbert Brown; "Evaluation of the Surgical Risk", F. H. McMechan; "Endotracheal Anæsthesia", M. Kasner Moss; "Position of the Patient during Induction of Anæsthesia", R. W. Hornibrook; "Cardiac Disease in Relation to Anæsthesia", M. C. Lidwill; "Some Remarks on Local Anæsthesia", C. E. Corlette; "Spinal Anæsthesia", R. Fowler; "Recent Developments in the Use of Rectal Narcotics", Kempson Maddox; "Ethylene and Nitrous Oxide in Upper Abdominal and Thyreoid Surgery", L. Lillies; "The Intratracheal Administration of Ethylene", L. S. Lowenthal; "Deaths under Anæsthesia at the Adelaide Hospital during 1928", T. W. Rollison; "Pathological Findings in Death during Anæsthesia", Geoffrey Kaye.

To show that we were keeping abreast of advances abroad, I shall call to your attention two interesting additions to the anæsthetist's drug cupboard. Ethylene was becoming the thing for the anæsthetist to give and the patient to have. Its virtues were extolled by L. Lillies of Melbourne and by L. S. Lowenthal, then a resident medical officer at the Royal Prince Alfred Hospital, Sydney. We were all interested in it because it enabled us to satisfy a demand by the patient for something other than ether. It was certainly less irritating and induction was relatively rapid and pleasant enough; moreover, recovery took place in a short time and was seldom accompanied by more than one bout of vomiting (and that at the close of anæsthesia), so the patient usually knew little of it. Muscular relaxation was satisfactory in those cases in which we could reasonably expect it to be so; but comparison with lower second plane ether anæsthesia would be cheating. The cost was about twice that of nitrous oxide, and as if to augment this there were the smell, the headache, and the Saturday afternoon drill cleaning the oily residues from the water chamber of the safety gas oxygen apparatus—no pleasant task indeed!

Kempson Maddox gave us his results of a painstaking research into "Avertin". He later published a book which was to become a reference book for us all. "Avertin" came to us at a time when patients were demanding to be put to sleep in their beds. It was a boon, and I think we have forgotten its value. From personal experience I can still recommend it to you. In the face of intravenous competitors I fear its revival would be difficult. When it is used with due caution and a knowledge of its limitations I consider that it is at least as safe as most of our present premedicaments. Recovery from a carefully considered dose is more certain and causes less anxiety to nursing staff than after the large amounts of "Pentothal Sodium" occasionally pumped in without regard to the patient's age or physical condition.

To this congress, travelling at his own expense from far-off Avon Lake, Ohio, came a missionary spreading the gospel of safer and better anæsthesia throughout the world. I refer to the late F. H. McMechan, who, though stricken down in a chair from a crippling form of arthritis so that he could scarcely move a limb, yet made this journey. His earnestness won the admiration of us all, and his presence certainly helped to make a success of our first meeting.

The next time we met was at Hobart, when the Australasian Medical Congress was held there. Leonard Lillies was president. The depression had lifted and all were in high spirits. We had some papers on endotracheal anæsthesia and an interesting discussion on drugs used for premedication and basal narcosis. Gilbert Brown, though he did speak about "Nembutal", "Sodium Amytal" and "Pernocton" given intravenously, made no mention of "Evipan Sodium"—was it already beginning to go out of fashion? Kempson Maddox gave us a further paper on "Avertin". Its advantages and disadvantages were the subject of much discussion. A scheme for the teaching of anæsthesia was outlined by Geoffrey Kaye, which summed up the position at that time and gave suggestions which he will no doubt reiterate later at this meeting. The late Newport White, of Melbourne, read a paper on "The Accidents and Mistakes of Anæsthesia", which was most illuminating, for we learn good lessons from relating our misadventures. It was at the close of this session that a meeting took place at Hadley's Hotel to discuss the formation of an Australian society of anæsthetists. Geoffrey Kaye was elected temporary secretary and a tentative constitution was drawn up. He worked hard but willingly for us for years; his work has borne good fruit, and I hope he feels it was worth while.

The centenary of the foundation of Melbourne was celebrated in 1935 and the Australian Society of Anæsthetists held its first annual meeting there to mark the occasion. Gilbert Brown returned from England to be in time to act as president at this first session and gave an account of anæsthetic advances abroad. He told of the enormous increase of the use of gaseous anæsthetics in England and of the fashion to fit some form of carbon dioxide absorber to gas machines—a "Yankee" idea, and what a valuable one it has proved to be! He spoke of cyclopropane as a gas with a future. I saw it used for the first time by Nosworthy at Westminster Hospital in September, 1935. Brown mentioned spinal anæsthesia with "Percaine" (1 in 1,500 solution) for lobectomy, as used by Magill at the Brompton Hospital.

Gilbert Troup gave a talk on his American tour in search of newer means of anæsthesia. He visited Waters's clinic, where cyclopropane was tried out. He told of a new intravenous anæsthetic, "Thio-Nembutal", which Lundy was using. This, later known as "Pentothal Sodium", was destined to sweep all other intravenous anæsthetics aside. To this meeting came Z. Mennell, senior anæsthetist of Saint Thomas's Hospital, representing the Association of Anæsthetists of Great Britain and Ireland. His paper "Ether is not Dead" gave rise to a lively discussion and an exchange of letters in the journals later on.

The fifth session of the Australasian Medical Congress (British Medical Association) at Adelaide was the opportunity for a combined gathering of the Section of Anæsthesia and the Australian Society of Anæsthetists. Gilbert Troup presided, gave an account of the position of the anæsthetist at that time, and paid a tribute to the late Kasner Moss of Perth. There were four papers. One paper by Gilbert Brown on anæsthesia in pulmonary tuberculosis was based on his own experience in 208 cases. Gilbert Troup combined with Gilbert Brown in a paper to detail their impressions of "Pentothal Sodium" and their results. S. V. Marshall gave a paper on cyclopropane, recording the results of 120 cases in which it was used by himself and myself in Sydney. The most interesting presentation was from Geoffrey Kaye, who made a collection of anæsthetic fatalities from general hospitals in the principal cities of Australia, from which he showed that one patient in a thousand undergoing anæsthesia died on the operating table.

No meeting was held during the war years, and it was not until the Sydney meeting of January, 1946, that we saw each other again. The material presented there is still fresh in your minds.

We are gaining many new members and inquiries are coming from a great number of the younger graduates concerning the prospects of an anæsthetist. When they ask me how to go about becoming an anæsthetist, I advise them to combine anæsthesia with general practice, and after a couple of years to make up their minds if they want to go into it, for I think many "interns" become

fascinated by this blonde and glamorous lady and woo her ardently. It needs the knocks of general practice to make them decide whether they want to remain true to her for the rest of their days. A number of older general medical practitioners, seeking an easier life, consider retiring into anæsthesia; but the difficulty of gaining a surgical connexion and becoming familiar with modern methods has to be pointed out to them, hard though it is, lest they give up the substance for the shadow. The anæsthetist nowadays must know something about every branch of modern medicine and some branches of surgery, and moreover, must have a higher degree in anæsthesia to gain a hospital appointment.

Conclusion.

We all hear complaints from surgeons about the poor quality of present-day anæsthesia, and they attribute this to lack of teaching; but we know that it is due to the fact that specialized methods are not available to the average general practitioner—he has not the time to study or practise them. Talk of nationalization is in the air and we must see that the specialist in anæsthesia is adequately paid for his services. A pointer to the fact that his services are being recognized is the recent advertisement for a full-time anæsthetist to a New South Wales hospital at a salary of £1,500 rising to £2,000 per year. This is a valuable and significant change and will give us a basis for argument when the question of remuneration arises.

CONTROLLED RESPIRATION.[1]

By R. H. ORTON,

Anæsthetist to the Thoracic Surgical Unit, Alfred Hospital, Melbourne.

CONTROLLED RESPIRATION may be defined as an anæsthetic technique in which a state of apnœa is produced and respiratory exchange is maintained by periodic inflation of the lungs throughout the duration of anæsthesia. The muscles of respiration are at rest, neither the diaphragm nor the intercostal muscles contracting.

Historical Review.

The first reference to the use of controlled respiration appears in a paper published by Guedel and Treweek[(1)] in 1934. They used periods of apnœa during ether anæsthesia for abdominal surgery to provide better operating conditions for the surgeon. In 1940 Crafoord[(2)] published a report of the use of a spiro-pulsator for the performance of artificial respiration during intrathoracic surgery. This apparatus was received with admiration by the thoracic surgeons, but was little used outside Crafoord's unit in Scandinavia. It required the presence in the operating theatre, not of an anæsthetist, but of a mechanical engineer who worked under the direction of Crafoord. The technique of controlled respiration was put on a firm basis when Nosworthy[(3)] introduced the simplified method that he had developed. His paper still stands as a milestone in modern anæsthetic practice.

Advantages and Disadvantages.

Controlled respiration maintains the carbon dioxide tension in the blood at the normal level. This fact is most important when agents are used which depress respiration, such as cyclopropane and curare. If the carbon dioxide level is allowed to rise during anæsthesia, it has been shown by Dripps[(4)] that a condition of shock is likely to appear at the termination of the administration. Controlled respiration prevents this rise and the condition of shock is avoided.

The use of controlled respiration during operations involving the use of an open pneumothorax prevents mediastinal "flap" and paradoxical respiration, two of the major hazards in thoracic surgery. These facts will be discussed in detail later.

Since with controlled respiration voluntary respiration is abolished, muscular exertion is reduced to a minimum. The only striated muscles that are actively contracting are those of the heart. It follows from this that the metabolism of the patient is reduced to the lowest possible value, and prolonged surgical procedures are possible without the patient suffering from exhaustion. Owing to the absence of diaphragmatic contraction, the surgeon, whether working on the thorax or on the upper part of the abdomen, is provided with more satisfactory conditions than are possible with spontaneous respiration.

Certain objections have been made to the use of controlled respiration. It has been stated that this technique will produce alkalosis. This was probably true when agents such as nitrous oxide were used and it was necessary to over-ventilate the patient's lungs in order to produce apnœa. With cyclopropane such over-ventilation is unnecessary and should not be used. Under such conditions the carbon dioxide tension in the blood is maintained at the normal level, and no disturbance of the acid-base balance takes place. The other objection that has been raised has been the fact that the respiratory signs of anæsthesia are abolished by the method. This is true; but no one today would say that endotracheal anæsthesia must not be used in cerebral surgery, because the eyes are not available for inspection. The anæsthetist now must learn to judge the depth of anæsthesia by methods other than the visual inspection of the respiratory movements. He must learn to appreciate, by his sense of touch, the progressive loss of tone in the thoracic cage as anæsthesia deepens.

Physiology.

In order to understand the mechanics of controlled respiration, it is necessary to consider the forces that act upon the pulmonary tissues. With the normal closed thorax, it is usual to state that a negative pressure exists in the pleural cavity, which varies from −5·0 millimetres of mercury on expiration to −10·0 millimetres on inspiration. Since the pleural cavity is merely a potential space, no negative pressure can exist therein. The forces that are active at this site are, firstly, the elastic recoil of the lung tissues, which increases from five millimetres of mercury on expiration to ten millimetres on inspiration. This force acts in an inward direction all round the lungs, pulling on the bony cage, the diaphragm and the mediastinal tissues. The second force, which opposes and equals the elastic recoil, is one which prevents the separation of the parietal and visceral parts of the pleura.

Open Pneumothorax with Spontaneous Respiration.

When one side of the chest is opened widely and the patient is allowed to breathe spontaneously, the resultant disability will depend upon whether or not the mediastinal tissues have been rendered rigid. If chronic inflammation has fixed the mediastinum the changes that take place during inspiration and expiration will be those represented in the upper diagrams of Figure I. At first glance it would appear that little disturbance is produced. The lung collapses fully, and efficient respiration occurs upon the side of the closed thorax. It must be remembered, however, that the tidal exchange of the patient has to be accommodated in one lung. In order that this may be accomplished, the muscles of respiration must increase their movements to double the range through which they were moving before the chest was opened. This produces violent excursion of the diaphragm, and calls into play various accessory muscles. Under such conditions, if the operation is prolonged, progressive fatigue of the respiratory muscles is likely to occur, with a rise of the carbon dioxide level in the blood. If, on the other hand, the mediastinum is mobile, the respiratory movements are those represented in the lower diagrams of Figure I. In the first place, since the mediastinum is mobile, even in the position of expiration, the mediastinal structures will move across to the side of the closed thorax, thus reducing its capacity. When inspiration takes

[1] Read at the annual meeting of the Australian Society of Anæsthetists (British Medical Association) on April 15, 1947, at Adelaide.

place, the attempt on the part of the patient to enlarge the thorax will be defeated by the movement of the mediastinum still further towards the side of the closed thorax. This condition is known as "mediastinal flap". In addition, during inspiration air will be drawn from the lung on the open side into the opposite lung. On expiration, the air will be expelled, not up the trachea, but back into the lung on the open side, which will be partly expanded with vitiated air. To this disability has been given the name of "paradoxical respiration", since the visible lung contracts on inspiration and expands on expiration. Under such adverse conditions no respiration may take place up and down the trachea, and the patient dies from asphyxia.

Open Thorax Anæsthesia with Positive Pressure.

The first method of anæsthesia that was introduced in an attempt to overcome the difficulties of open thorax was positive pressure anæsthesia. This method now has

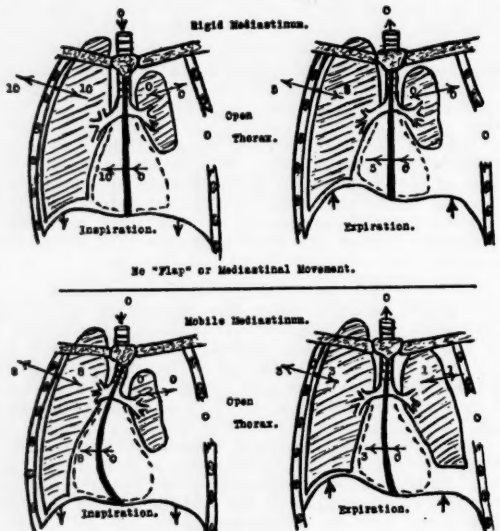

FIGURE I.
Voluntary respiration at atmospheric pressure.

few applications. It can be demonstrated that if the pressure of delivery is maintained at a low value, no stabilization of the mediastinum takes place, and since the lung on the side of the open thorax is held in a semi-inflated condition, a considerable proportion of the pulmonary circulation is shunted through lung tissue which is not taking part in the respiratory exchanges. Cyanosis and anoxia must result. If the pressure of delivery is raised to a value that will ensure stabilization of the mediastinum, then the lung on the side of the open thorax will be fully distended and will bulge through the operation wound. Surgical access becomes impossible. This method of anæsthesia finds its main use in the operation for the removal of a hydatid cyst from the lung.

Controlled Respiration.

The Respiratory System.

The mechanics of respiration during control are illustrated in Figure II. When a state of apnœa is produced by the anæsthetist, the respiratory muscles come to rest in the position of expiration. Both lungs are collapsed, the diaphragm is elevated and the mediastinum is moved across towards the side of the closed thorax. The elastic recoil of the lung falls to a value below that of normal expiration with a closed thorax because of the mediastinal shift. During the inspiratory phase, the anæsthetist applies to the lungs a positive pressure of approximately five millimetres of mercury. This pressure changes the force of elastic recoil into a push which thrusts against the thoracic cage, the diaphragm and the mediastinum. The thoracic cage enlarges, and the half of the diaphragm on the closed side descends, pushing before it the abdominal contents, and displacing upwards the half of the diaphragm on the open side. The mediastinum moves across, enlarging the closed thorax, and the collapsed lung partly expands. During the expiratory phase, the positive pressure is withdrawn and the tissues return to the position of expiration, expelling the anæsthetic gases up the trachea. In contrast to the mediastinal swing or flap with spontaneous respiration, the movement that takes place with controlled respiration is beneficial to the patient, as it allows the lung on the closed side to expand under a minimum of inspiratory pressure. Further, the expansion and contraction of the exposed lung are no longer paradoxical, but also aid the respiratory exchanges. With controlled respiration the dangers of open pneumothorax are avoided and efficient respiratory exchanges are possible. When the anæsthetic agent or curare is producing respiratory depression, this can be readily countered by the use of the technique of control, no matter whether the thorax is open or closed.

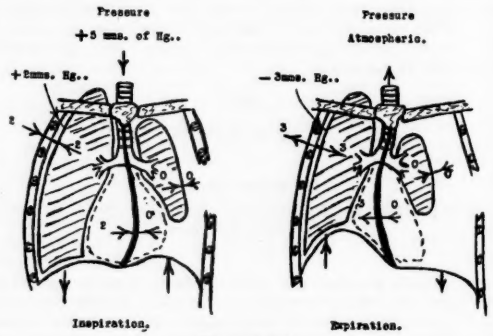

FIGURE II.
Controlled respiration: pressure of +5·0 millimetres of mercury on inspiration.

The Circulatory System.

In the past it has been taught that the so-called negative pressure in the pleural cavities is an important factor in maintaining efficient circulation, and that one of the major difficulties of open pneumothorax anæsthesia is the abolition of this negative pressure. With the use of controlled respiration, not only is the negative pressure abolished on the side of the open thorax, but on the closed side it is converted to a positive pressure during the inspiratory phase of respiration. Modern teaching by physiologists is that the venous return of the blood to the heart is little influenced by the presence or absence of a negative pressure within the thorax, and this has been confirmed by my own observations during operations involving the use of an open thorax. During these operations, cardiac output is higher with controlled respiration than when the patient is allowed to breathe spontaneously. This increased output is indicated by a rise in pulse pressure when control is initiated, the rise being due to a disproportionate fall in the systolic and diastolic readings. Further, it has been found that there is a rise in blood pressure during each inspiratory phase of respiration. It would appear that the better cardiac output may be due to a compression of the ventricles by the see-saw action of the two halves of the diaphragm during controlled respiration.

The Metabolism.

When a patient is allowed to breathe spontaneously in the presence of an open thorax, a vicious circle is set up which results in a considerable increase in the metabolism of the patient (Figure III). The increased respiratory movements of the patient caused by the open thorax raise the metabolism. The raised metabolism results in a

greater output of carbon dioxide, and this in turn stimulates the respiratory centre, producing further activity on the part of the respiratory muscles. The vicious circle continues until stabilization finally occurs; but the ultimate muscular exertion and metabolism of the patient are far above the normal resting values.

With controlled respiration, on the other hand, the reverse process takes place (Figure IV). The quiescent respiratory muscles lower the metabolism of the patient to the lowest possible value, and the patient is placed in a condition of rest that is not obtainable with any form of spontaneous respiration.

Surgical Access.

When the surgeon is working on the thorax or the upper part of the abdomen, the absence of active contraction of the respiratory muscles is a great help. I myself have found that, if the patient is allowed to resume spontaneous respiration during an intrathoracic operation, the surgeon immediately notes the more difficult operating conditions and requests that control should be reestablished. In upper abdominal surgery, especially when it is combined

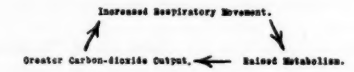

FIGURE III.

with the use of curare, the surgeon is provided with a quiescent field not obtainable with any other form of anæsthesia or analgesia.

The Establishment of Control.

In a previous paper[5] the changes that take place in the carbon dioxide tension of the blood during anæsthesia when spontaneous respiration and controlled respiration are used have been discussed. With controlled respiration, the threshold of the respiratory centre to stimulation by carbon dioxide is raised and the carbon dioxide tension of the blood is maintained at its normal level so that apnœa results. Various methods have been described for the establishment of control of respiration, and these will now be discussed in some detail.

1. The level of the carbon dioxide in the blood is lowered by hyperventilation. This method was used by Guedel and

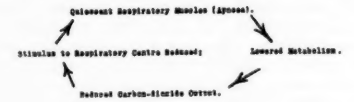

FIGURE IV.

Treweek,[1] but is of only historical interest, as the hyperventilation washes out the carbon dioxide from the blood and causes alkalosis.

2. The threshold of the respiratory centre is raised by heavy premedication and an anæsthetic of low potency is employed (nitrous oxide). This principle was employed by Crafoord;[2] but it seems probable from his descriptions that some degree of hyperventilation took place and therefore the method has the disadvantage of that previously described.

3. The threshold of the respiratory centre is raised by premedication and by the use of "Pentothal Sodium". An anæsthetic of high potency (cyclopropane) is employed. The classical paper by Nosworthy[3] describes this method. The apparatus is simple, and since all the anæsthetic agents employed are respiratory depressants, no hyperventilation is required to bring about the state of apnœa. With this technique there can be no danger of alkalosis.

4. The voluntary respiration is abolished with large doses of curare and anæsthesia is maintained with an agent of low potency (nitrous oxide) by means of artificial respiration. The first published description of such a method was given by Harroun and Hathaway,[6] who employed "Intocostrin" as their curarizing agent. The doses of curare were extremely large and produced complete flaccid paralysis of all voluntary muscles. It is now recognized that to use curare in this manner is likely to lead to profound shock. The paralysis of the muscles causes pooling of the blood therein and reduction in the circulating blood volume. Furthermore, all signs of anæsthesia are abolished and the anæsthetist is faced with the problem of maintaining his patient in a very narrow plane, between consciousness with inability to move a muscle on the one hand and anoxia on the other. The signs of lightening anæsthesia, as set out by the writers, resemble so closely those of suboxygenation that it is thought that this method of establishing control has many dangers. The advantage that they claim for the method is that it allows the use of the diathermic cautery during operations within the thorax; but the price that they pay for this benefit in added risk to the patient is too high.

5. The threshold of the respiratory centre is raised with "Pentothal Sodium", and respiration is abolished with curare. Anæsthesia is maintained with "Pentothal Sodium" and artificial respiration is performed with oxygen. Halton[7] described this method using the British preparation of curare, "Tubarine". The method has the disadvantage that, unless surgical procedure is rapid, the dosage of "Pentothal Sodium" may become excessive and the post-operative period of unconsciousness may be unduly prolonged.

6. The threshold of the respiratory centre is raised with premedication and with "Pentothal Sodium", anæsthesia is maintained with cyclopropane and the bronchial reflexes are controlled with curare. At the thoracic surgical unit of the Alfred Hospital, Melbourne, this has been the method employed in the last forty intrathoracic operations. It is usually stated that the only action of curare is on the neuromuscular junctions. With the introduction of curare into the department, it was soon realized that curare, in doses which did not paralyse muscles, abolished bronchial reflexes, and that it was possible to maintain the patients in an extremely light plane of cyclopropane anæsthesia without the appearance of any of the usual bronchial spasms when either the bronchus was handled by the surgeon or tracheal suction was used by the anæsthetist. In the cases in which this technique has been used, consciousness has been recovered within one or two minutes of the termination of the operation. Some of these operations lasted up to five hours, and in no case did any post-operative vomiting occur. The value of this method is that all the disadvantages of deep anæsthesia are avoided. It is well recognized that light cyclopropane anæsthesia is non-toxic; it does not produce shock and the incidence of post-operative vomiting is low. The same cannot be said for deep cyclopropane anæsthesia. Many of the benefits of cyclopropane are lost if the patient is maintained in the deeper planes for long periods of time. With the method described, it is never necessary to employ anæsthesia deeper than the first plane of the third stage. The signs of unduly light anæsthesia are a rapid pulse and spasmodic contractions of the diaphragm. Even at such levels the bronchial reflexes are readily abolished with small doses of curare.

Controlled Respiration in Thoracic Surgery.

1. *Premedication.*—Heavy premedication is unnecessary and undesirable in thoracic surgery. The usual dosage for an adult patient is one-sixth of a grain (0·01 gramme) of morphine and one one-hundred-and-fiftieth of a grain (0·0004 gramme) of hyoscine. For children the dosage of morphine is reduced proportionately and atropine is substituted for the hyoscine.

2. *Induction.*—Anæsthesia is induced by the intravenous administration of "Pentothal Sodium". The average dose for the adult is 0·5 gramme.

3. *Intubation.*—In all intrathoracic operations the larynx is intubated. The technique of intubation is always peroral. Two alternatives are possible. The larynx may be sprayed with local anæsthetic solution before induction of anæsthesia with cyclopropane, or a combination of "Pentothal

Sodium" and curare may be used. Recently the latter method has been employed as a routine measure. The average adult dosage is 0·5 gramme of "Pentothal Sodium" and 15 milligrammes of "Tubarine". When this technique is employed for children, the "Tubarine" dosage is determined on the basis of 1·5 milligrammes per stone of body weight (0·25 milligramme per kilogram).

4. *Maintenance.*—During the maintenance of anæsthesia it is necessary that the bronchial reflexes should be abolished for periods throughout the operation. Three alternatives are available to the anæsthetist. Firstly, the depth of anæsthesia may be increased at such times as are necessary by the addition of further quantities of cyclopropane to the anæsthetic mixture. Secondly, particularly if cardiac irregularities are encountered with cyclopropane, ether may be added to the anæsthetic mixture in order to control bronchial reflexes. Or thirdly, curare may be used at intervals when bronchial reflexes become active, the patient being maintained in a uniform plane of light anæsthesia. The dosage of "Tubarine" at present employed is 1·5 milligrammes per stone (0·25 milligramme per kilogram) of body weight as an initial intravenous injection, followed at intervals of twenty to thirty minutes by further injections of one-third of the initial dose. No further "Tubarine" is given after the bronchus has been ligated or within forty-five minutes of the termination of the operation. When this method is used, it must be borne in mind that the bronchial reflexes are abolished, and therefore that the usual signs of secretions within the bronchial tree are absent. It is essential for the anæsthetist to perform tracheal suction at frequent intervals in order to prevent the possible spread of infection. When curare is employed, such frequent suction does not disturb the plane of anæsthesia, and there is no "bucking" of the patient, such as occurs without the use of curare.

5. *Termination of Control.*—When the pleural cavity has been closed, spontaneous respiration is allowed to return. This should reappear within thirty seconds of the cessation of intermittent inflation. It is well, during the stage of maintenance, to allow the patient periodically to return to spontaneous respiration. If this occurs within thirty seconds, then the carbon dioxide tension in the blood has not been unduly lowered. If a longer period elapses, then the patient's lungs are being hyperventilated and the range of excursion of the inflations must be reduced. At the end of the operation, and when spontaneous respiration has been resumed, a change is made to continuous flow technique, nitrous oxide being used. A start is made with a mixture containing 80% of oxygen, and this percentage is gradually reduced until, if possible, the patient is receiving a mixture containing 20%. If it is found impossible to reduce the oxygen percentage to this level, then the patient is brought out of anæsthesia in an oxygen-enriched atmosphere and returned to bed receiving continuous oxygen therapy. In all cases the patient is given oxygen therapy on return to bed; but the termination of the anæsthesia is used as a guide to the possible oxygen requirements of the patient in the immediate post-operative period.

6. *Equipment.*—The first essential in any equipment used for controlled respiration is that it shall be free from leaks. The standard set-up for many years has been the Waters' canister connected to an endotracheal catheter fitted with an inflatable cuff. The only objection to this is that the canister is close to the face, and clumsy. To overcome these defects, the Coxeter-Mushin apparatus was introduced and has been in use at the Alfred Hospital for the past fifteen months. It has proved very satisfactory, and possesses the added advantage that the anæsthetist has some control over the expiratory phase of respiration as well as over the inspiratory portion.

Controlled Respiration in Abdominal Surgery.

Abdominal surgery, particularly surgery of the upper part of the abdomen, demands adequate muscular relaxation, which can be produced in three ways: firstly, by the use of deep inhalational anæsthesia, as with ether; secondly, by means of high spinal analgesia; and thirdly, by a combination of light anæsthesia, as with cyclopropane, and some preparation of curare. All these methods cause respiratory depression by intercostal paralysis, since relaxation of the upper part of the abdomen is not possible without paralysis of the intercostal muscles.

Respiratory depression, however produced, has two results. There must always be retention of carbon dioxide in the blood. This may not appear important during the administration; but it is a probable cause of post-operative fall of blood pressure when the source of respiratory depression is removed.[4] The second result of respiratory depression may be a degree of anoxia. This will occur only if the depression is severe. Of these two results, anoxia can be readily countered by the efficient administration of oxygen; but, so long as the respiratory depression remains, the administration of oxygen will have no beneficial influence on the carbon dioxide retention. The use of controlled respiration is essential when any form of general anæsthesia or curare is used which causes respiratory depression. It places the anæsthetist in the position in which he can ignore, and even make use of, a factor which was a constant worry to anæsthetists of an earlier age. In passing, it should be noted that no form of therapy is available to the patient under high spinal analgesia to counter the effects of respiratory depression.

Local Anæsthesia for Pulmonary Resection.

It would appear, from the previous discussion, that controlled respiration offered such distinct advantages over any form of anæsthesia involving voluntary respiration that there would be little opposition to its use. Largely as the result of the advocacy of Overholt,[5] local anæsthesia has received some support for intrathoracic surgery. It is thought that the most useful method of studying the position is to take the section from the article by Overholt and examine the claims that he makes for local anæsthesia.

Referring to general anæsthesia, Overholt states that "the cough reflex is overstimulated with an intratracheal tube". This is incorrect. The presence of a tube in the larynx has been shown by Jackson not to stimulate a cough reflex; this stimulation occurs only when the tube is moved. An endotracheal tube fitted with an inflatable cuff cannot move in the larynx. In any case, Overholt employs an endotracheal tube in his local anæsthesia technique.

Overholt's next statement is that "repeated aspiration causes bronchospasm with loss of control over anæsthesia, anoxia, and vago-vagal reflexes". If these facts are true for general anæsthesia, surely they are even more true for local anæsthesia. But in fact they are not true for general anæsthesia when curare is used to control the bronchial reflexes. Overholt then states that "prolonged anæsthesia leads to tissue anoxia and favours shock". With controlled respiration it is obvious that the risk of tissue anoxia is much less than when a patient is breathing spontaneously under local anæsthesia. Overholt objects to deep anæsthesia, which he states "relaxes bronchial musculature and favours the flow of secretions". Deep anæsthesia is not used, and one wonders whether Overholt has ever postured a conscious patient to see whether deep anæsthesia is required to allow the flow of secretions. Finally, Overholt claims that the "depressed reflexes following anæsthesia favour stagnation of secretions". The patients at the termination of general anæsthesia have active reflexes and are capable of coughing before leaving the operating theatre.

Overholt then makes certain claims for local anæsthesia. The first is as follows:

1. A better control of intrabronchial secretions can be obtained.
   - (*a*) Retained secretions in the abnormal lung are not released by bronchial relaxation.
   - (*b*) Aspirations do not disturb the plane of anæsthesia or result in periods of anoxia.
   - (*c*) The cough reflex is present throughout the operation and is effective at the conclusion of the operation.

Paragraphs (*a*) and (*b*) have already been discussed. In regard to (*c*) some comment is needed. It is taught

by such authorities as Churchill that no patient with an open thorax should be allowed to cough, as secretions will be spread throughout the lungs. But, in justice to Overholt, it is found when he describes his method of anæsthesia that he employs a full local application to the pharynx and bronchial tree, and blocks the vagus when the chest is opened. In his final statement at the end of his discussion he states that "the cough reflex returns soon after the endotracheal tube is removed". It is to be presumed that he does not wish to state that the cough reflex is present throughout the operation. If such is the case, it is certain that the anæsthetist using controlled respiration has better control of intrabronchial secretions than is possible under local anæsthesia.

Overholt's second claim is as follows: "The anæsthetic agent is less toxic." This is a very debatable question, whether a quantity of local anæsthetic solution applied to the bronchial tree and the infiltration with 400 millilitres of 0·4% "Novocain" solution are less toxic than light cyclopropane anæsthesia. The consensus of opinion would probably be in favour of the latter method.

The third claim made by Overholt is as follows: "The immediate post-operative condition of the patient is better and nursing care is simplified. Nausea and vomiting rarely occur. The oral intake of fluid and nourishment can be started sooner." In the thoracic unit at the Alfred Hospital we have not encountered post-operative shock since using controlled respiration. The patients are conscious and cooperative on return to bed, and no post-operative nausea or vomiting has occurred in the last forty cases. Frequently the patients ask for a drink of water in the operating theatre within two minutes of the termination of the operation. It does not seem likely that Overholt can give nourishment earlier than this.

In the case of a recent pneumonectomy for pulmonary tuberculosis occupying five hours, the patient was returned to bed. The anæsthetist followed the patient and reached the bedroom as the patient was lifted into bed. She then asked for her dentures, inserted them and requested a cup of tea, which she drank with obvious enjoyment. On being questioned the next morning, the patient stated that she remembered her pharynx being aspirated after the removal of the endotracheal catheter, and this was within two minutes of the termination of a five-hour operation.

From this it would appear that the claims made by Overholt in favour of local anæsthesia are very slender. Doubtless many patients suffering from pulmonary tuberculosis could be operated upon under local anæsthesia with a minimum of upset, since the mediastinum would have been fixed by the disease. But this is not true of many other conditions requiring an operation in the presence of an open thorax. With controlled respiration, the anæsthetist can be certain that, no matter what the age of the patient or the condition of the mediastinal tissues, he will be able to carry the anæsthetic to a successful conclusion.

Summary.

1. Controlled respiration is defined and a brief review is given of the development of the technique. The advantages and disadvantages of the method are discussed.

2. The mechanics of open thorax respiration with normal and positive pressure are described.

3. The effects of controlled respiration upon the respiratory system, the circulatory system, the metabolism of the patient and surgical access are detailed.

4. The various methods by which control of respiration may be established are set out and the defects of each are considered. The present method employed by myself is given.

5. The use of controlled respiration in thoracic surgery is detailed and technical procedures are described.

6. The application of controlled respiration to the problems of respiratory depression in upper abdominal surgery is stated.

7. The use of local anæsthesia in pulmonary resection is reviewed and the claims made for it are criticized.

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A REVIEW OF CURARE AS AN ADJUVANT TO GENERAL ANÆSTHESIA.[1]

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THE honour of addressing you on such an intriguing subject as curare in general anæsthesia, at this, the first annual meeting of the society to be held in Adelaide, is greatly appreciated. My personal experience with curare is limited—to wit, 65 cases. Therefore a review with this small background can only state observations and endeavour to correlate and enlarge upon them from the literature which is rapidly becoming voluminous.

Our appetite for the use of the drug was first stimulated at the last annual meeting over a year ago by the paper presented by H. J. Daly and S. V. Marshall.(1) To them belongs the honour of first using curare in anæsthesia in Australia, on August 11, 1945.

My cases were mainly limited to surgery of the upper abdomen—for example, operations on the gall-bladder, common duct operations and gastrectomies. There were three intrathoracic procedures, two abdomino-perineal excisions, one Smithwick operation, and two prostatectomies. Age groups ranged from thirteen to seventy-six years. "Intocostrin" (Squibb) was used in 41 cases and *d*-tubocurarine (Burroughs Wellcome and Company) in 24.

Curare was given in the majority of cases as an adjuvant to cyclopropane. Anæsthesia with the latter was kept mainly in the first or second plane of the third stage. In a few cases the anæsthetic given was "Pentothal" with or without nitrous oxide and oxygen. In all the closed circuit method was the technique for administering the anæsthetic gases, and respiratory control was frequently utilized. Curare in the intrathoracic procedures was used only to aid intubation, and in the prostatectomies to give added relaxation for the enucleation of the prostate.

When I reviewed my record cards and examined the literature, it seemed to me that the following points were appropriate and relevant for discussion in this paper.

Relaxation.

The relaxation produced by curare comes up to all that the literature has promised. The "blotting paper" type of relaxation found in spinal analgesia is reproduced in the majority of cases. Failure of this to appear can be attributed to lack of experience in calculating the correct dosage for the particular patient. Somewhat naturally in using this new, potent and expensive drug one has erred on the conservative side in regard to dosage.

[1] Read at the annual meeting of the Australian Society of Anæsthetists (British Medical Association) on April 15, 1947, at Adelaide.

Diminished Respiratory Exchange.

Diminished respiratory exchange is of course intimately associated with relaxation from the myo-neural block of the intercostal muscles and diaphragm. It is this interference with normal physiological function for which we, as anæsthetists, have to find an adequate answer. This diminished function can be met only by aiding the respiratory exchange with the routine means we have at hand and which should be well known to all anæsthetists if they are going to use curare. This aspect has been admirably stressed by Orton.[2] Dripps, in his excellent article[3] on the cause of shock following cyclopropane anæsthesia with its inevitable respiratory depression, shows that the higher the carbon dioxide retention during administration, the greater the likelihood of a post-anæsthetic fall in blood pressure. The antidote is obvious—namely, adequate ventilation of the lungs with controlled respiration, together with proper absorption. When curare is used in combination with cyclopropane, the need for this adequate respiratory exchange is of increased and paramount importance if the physiological needs of the patient are to be met. Dripps finally quotes that doyen of modern anæsthesia, Ralph Waters, as follows:

> Unless the administrator is familiar with the physiologic basis of anesthesia, he will do well to use a technique other than carbon-dioxide absorption and an agent other than Cyclopropane.

To this might well and truly be added now the use of the potent "arrow poison".

I have not up to date had to call upon the antidote "Prostigmin". Gray[4] and Halton[5] recommend when this is used that one-fiftieth of a grain of atropine be added to counteract the sympatheticomimetic effect of "Prostigmin"; but Smith *et alii*,[6] in spite of repeated doses of "Neostigmin" up to a total of 3·5 milligrammes without atropine, found no significant muscarine action on the gastro-intestinal tract, urinary bladder or cardio-vascular system.

Post-Anæsthetic Shock, Respiratory Depression and Paralytic Ileus.

Recently attention has been drawn to post-anæsthetic shock, respiratory depression and paralytic ileus as complications of the use of curare by Massey Dawkins in a letter to the *British Medical Journal*.[7] He voices criticism by nurses which condemns the condition of patients who have been treated with curare, on three grounds: (i) increased incidence of shock, (ii) increased degree of respiratory depression, and (iii) increased incidence of paralytic ileus.

A. J. Gray[8] joins issue on the ileus question. He points out that although the original belief that a parasympatheticomimetic action of curare caused gut contraction is probably not correct so far as *d*-tubocurarine is concerned, the opposite condition has never been suggested. Gray considers that the untoward results quoted by Dawkins were probably due to faulty administration. He disagrees also with the alleged increased incidence of shock after curare and considers that this drug has at last invalidated Crile's nociceptive theory, part of which was the belief that the fall of blood pressure could be minimized by deep anæsthesia. That the light anæsthesia used with curare as an adjuvant is not harmful is borne out by Knight and Baird,[9] who make the following statement: "It has been shown that 15 minutes of deep third plane anæsthesia is as harmful to the patient as two hours of first plane anæsthesia." Knight[10] goes farther and states that "deep general anæsthesia is more damaging and shock producing than even the trauma of surgery".

While those of us who have been in practice long enough have learnt to respect the observations of the intelligent trained nurse, we also know that sometimes progress is delayed by prejudiced observation of the perhaps not so intelligent. My own impression, from a close follow-up in my small series, is that the incidence of such complications as Dawkins mentions is no greater after the use of curare than after other methods in similar cases, and it anything, is less.

One case of post-operative partial ileus occurred in my series. It followed an embarrassing blowing up of the stomach with my respiratory control during the operation. The patient had a difficult airway, and I made the mistake of not inserting an endotracheal tube in the initial stages. I take full blame for this case, in which fortunately no eventual harm resulted.

Has Curare a Central Action?

The literature abounds with apparently contradictory statements in answer to the question whether curare has a central action. Gray and Halton[11] think that curare may prevent the acetylcholine receptor union in the central nervous system synapses, but only in large doses. Perhaps the most convincing evidence against a central action so far as *d*-tubocurarine is concerned is that presented by Smith *et alii*.[6] In this dramatic and remarkable human experiment, in which Smith acted as the human guinea-pig, 500 units of *d*-tubocurarine (Squibb) were injected over a period of thirty-three minutes. The dose was two and a half times that producing complete respiratory paralysis for this particular patient. The account of Smith's reactions is a classic of scientific fortitude, not the least part of which was having an endotracheal tube introduced when all faculties except those of voluntary movement and voice were acutely present. The net result was that even with this huge dose of the alkaloid no changes occurred in the electrocardiogram, the electroencephalogram, consciousness or sensorium, or in any aspect of higher central nervous system function. It was concluded that *d*-tubocurarine chloride had no significant central stimulant, depressive or analgesic action.

Prescott *et alii*[12] describe a similar experiment in England, in which Prescott was the guinea-pig. In this 30 milligrammes of *d*-tubocurarine of the English variety and standardization were the maximum dose given. The findings appear to have been somewhat similar to the results of the American experiment.

I do not know who won this international race; but I consider that we can take off our anæsthetic hats to two worthy gentlemen who voluntarily submitted themselves in the cause of science to the terrifying experience of respiratory obliteration with full consciousness.

Effect of Curare on Heart, Liver and Kidneys.

Gray and Halton[11] state that electrocardiographic findings are negative, and perfusion through the heart-lung preparation in dogs shows no effect on cardiac rate, output or venous pressure; hence the presumption is that there is no alteration in the coronary flow. They also state that kidneys and liver are completely unaffected by curare. However, they point out that as curare is in part changed by the liver and excreted by the kidney, the presence of renal damage of any consequence with an otherwise safe dose may well cause considerable embarrassment.

I had thought that curare as an adjuvant to cyclopropane might be the answer to our prayers for the ideal prostatectomy anæsthetic. Now I am not so sure. My experience is limited to two cases. One patient had an uneventful convalescence; the other hiccupped for ten days after operation, and nothing I did made the slightest difference until Nature finally cured him.

Standardization of Curare Preparations.

Standardization of curare preparations is at present most unsatisfactory. The original "Intocostrin" of Squibb is 20 units or milligrammes to the millilitre. Pender[13] states that one milligramme of the Squibb *d*-tubocurarine is equivalent to 6·5 units of "Intocostrin". One milligramme of the Burroughs Wellcome *d*-tubocurarine is apparently equivalent to about four units of "Intocostrin". The amounts put up in a millilitre also vary, and this adds to the confusion. Such variation can lead to tragedies, and the urgent need for international standardization of curare preparations is apparent.

Combinations of Curare and the Barbiturates.

Various authors have been enthusiastic in their advocacy of a combination of curare and the barbiturates over the more usual combination of curare and cyclopropane first

used by Griffith[14] in 1942. Knight[15] uses fractional doses of 20 units of "Intocostrin" with 50 milligrammes (2·0 millilitres) of a 2·5% solution of "Pentothal" and combines this with a nitrous oxide and oxygen mixture in the proportion of two to one. He regards this combination as the most universally applicable anæsthetic he has ever used. On theoretical grounds the proportion of "Pentothal" seems to be on the low side, and in the odd case or so in which I have tried the technique the results support this contention. Gray[4] and Halton[5] point out that *d*-tubocurarine (Burroughs Wellcome and Company) contains a harmless stabilizing agent which renders irreversible the precipitate formed when the substance is mixed with the barbiturates. Apparently this does not apply to the Squibb variety of the same alkaloid. Thus more confusion is created and the need for standardization is still more obvious.

Curare as an Adjuvant in Upper Abdominal Surgery.

It is in upper abdominal surgery that possibly curare is most valuable. As Schalit[16] points out, the disadvantages of high spinal anæsthesia in operations on the upper part of the abdomen include the lack of control of respiration in the adjustment of oxygen and carbon dioxide and the "knocking out" of the intercostal muscles for some time after the operation is concluded. Curare as an adjuvant overcomes these disadvantages if techniques are properly applied. Although other methods are available for surgery in this area, one feels that with curare an advance has been made in such cases towards increased surgical comfort and an improved post-operative condition.

Summary.

1. Curare appears to be a useful adjuvant to general anæsthesia with the gases, the barbiturates and possibly light concentrations of ether.

2. Curare enables surgical procedures requiring relaxation to be performed under light third stage anæsthesia with benefit to the post-operative course.

3. The use of curare demands anæsthetic experience, a sound basis of knowledge of physiology and the mechanical means and skill of providing a perfect airway with control of respiration. Now that curare preparations are easily obtainable, this aspect cannot be too fully stressed.

4. The present evidence suggests that in doses which are not excessive the more recent preparations of curare are non-toxic to the cardio-vascular system, the liver and the kidneys, and that its action is predominantly on the peripheral myo-neural junctions only.

5. The present lack of international standardization of preparations of curare is potentially dangerous.

Acknowledgements.

My thanks are due to my surgical colleagues in Western Australia, who have put up with much at my hands.

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ANÆSTHESIA IN THE AUSTRALIAN IMPERIAL FORCE.[1]

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THE paper which I am about to present cannot by any stretch of imagination be called scientific, and I feel extremely diffident at presenting it in such a distinguished gathering. It is a brief description of the type of anæsthetics which were given by me in the army, and of which I have kept records. As was explained in reference to the figures given in the symposium on spinal anæsthesia, the period covered is from April, 1940, to October, 1945. The units in which most of the work was done were the 2/1 Australian General Hospital and the 2/5 Australian General Hospital in Palestine, New Guinea and Morotai, with varying intervals at base hospitals in Australia.

There were in all 5,207 cases. These represent the vast majority, but not all, of the anæsthetics given in the units mentioned; but no adequate records of any others are available. This series consists of a widely different collection of cases. The nature of the surgical procedures carried out at any particular time depended on a number of different factors. Of these the character of the fighting, if any, in the vicinity, the number of troops and the presence of any special units attached to the different hospitals, were the most important. Where there were many battle casualties, the nature of the work was mainly the cleaning and suture of wounds of soft tissues, and the treatment of compound fractures and the like. Where there was a large concentration of troops in training, the incidence of appendicectomy and of repairs of hernia was extremely high, as was the number of operations for hæmorrhoids. If any special unit was attached—for example, a thoracic unit to the 2/1 Australian General Hospital in Palestine, or a facio-maxillary unit to the 2/5 Australian General Hospital in Moresby and Morotai—the work was largely determined by this fact.

Another important factor in determining the nature of the anæsthetic agents used was what was available. This in the army was variable. The 2/1 Australian General Hospital arrived in Palestine with almost enough 1 in 1,500 "Nupercaine" solution to bathe the Sixth Division, not a great deal of ether and very little else. There was no machine for endotracheal anæsthesia until I had a Flagg's can made out of a jam tin, and the machine supplied for the administration of nitrous oxide and oxygen was well qualified to rank with Stevenson's "Rocket" so far as antiquity was concerned.

There is nothing to be gained by an attempted analysis of the figures, but these are included to give some sort of idea of the nature of the work (Table I).

Spinal Anæsthesia.

It may well be asked why so many spinal anæsthetics were given. The reasons were threefold. The patients in the early days of the war at least, when confronted with the alternatives of "open ether" and spinal anæsthesia, in a large number of cases chose the latter. The

[1] *Read at the annual meeting of the Australian Society of* Anæsthetists (British Medical Association) on April 15, 1947, at Adelaide.

surgeons, although a trifle suspicious of the general use of spinal anæsthesia, soon became converted to it and liked it. To the anæsthetist with much routine work and minimal intelligent help it was a godsend, as it allowed for dual and sometimes triple lists of anæsthetics to be given simultaneously. For the first three years of the war the 1 in 1,500 solution of "Nupercaine" was used almost exclusively; only latterly was it replaced by the 1 in 200 solution made hyperbaric by the addition of 6% glucose.

The nature of the cases has been made fairly clear in the symposium on spinal anæsthesia. Repairs of the various types of hernia, appendicectomies and hæmorrhoidectomies were commonly carried out with spinal anæsthesia in the absence of any strong indication to the contrary. Those not given spinal anæsthetics included the patients who on rare occasions asked with some emphasis not to be given a spinal anæsthetic, those who had had a previous spinal anæsthetic with any unfortunate sequels, such as a prolonged headache, backache or the

TABLE I.

Type of Anæsthesia.	Number of Cases.
Spinal anæsthesia—	
Light "Nupercaine"	1,079
Heavy "Nupercaine"	805
Inhalational anæsthesia—	
Ethyl chloride, ether (endotracheal route)	84
Ethyl chloride	226
Ethyl chloride, ether	872
Chloroform	22
Chloroform, ether	38
Chloroform as an adjuvant to other forms of anæsthesia	30
Nitrous oxide, oxygen	9
Nitrous oxide, oxygen, ether	76
Nitrous oxide, oxygen, ether (all endotracheal route)	59
Cyclopropane	22
Intravenous anæsthesia—	
"Sodium Pentothal"	1,369
"Sodium Cyclonal"	27
Combined anæsthesia—	
"Pentothal", ethyl chloride, ether	168
"Pentothal", ethyl chloride, ether (endotracheal route)	62
"Pentothal", nitrous oxide, oxygen	45
"Pentothal", nitrous oxide, oxygen, ether	43
"Pentothal", nitrous oxide, oxygen, ether (last three by endotracheal route)	123
"Pentothal", cyclopropane	13
"Pentothal", cyclopropane (endotracheal route)	35

like, and those who had suffered from severe head injury or severe disease of the central nervous system such as cerebro-spinal meningitis.

Technique and Dosage.

The Howard Jones technique was followed with some modifications in most of the cases in which the 1 in 1,500 solution was used. This was in a high degree satisfactory in the types of operation mentioned. For cases in which a higher level of anæsthesia was desired, a modification of the Lake technique was sometimes employed. This was brought to my notice by Major Graham Macpherson, of Hull, a surgeon who had a great interest in spinal anæsthesia, and who first indicated to me that the puncture of the spinal theca with the patient in the prone position was not so phenomenally difficult as it might sound. Experience proved this to be the case, though the pressure of the cerebro-spinal fluid with the patient in this position was lower than when he was in the lateral position, and occasionally some doubt might arise as to whether or not the theca had actually been entered. Puncture in this position, and the injection of 11 or 12 millilitres of the light solution produced anæsthesia which, by adequate posturing of the patient so that the lower thoracic roots were the highest point of a curve seen in profile, could be limited to the area desired, and could not, owing to the inability of fluids to run uphill, go beyond a fixed, predetermined level. One of the disadvantages of this, however, was the posturing which involved draping the patient across a sandbag or pillow placed under the lower ribs and which was unpopular, as it tended to accentuate the nausea that often accompanied the onset of high level anæsthesia. The dosage for upper abdominal surgery was higher than that for lower or mid-abdominal blocks; but the doses of 14 to 16 millilitres which had prevailed in the pre-war period were never used. For the repair of a hernia or removal of an appendix a dose of 10 to 11 millilitres was usual. A similar dose was used for any other operation involving the distribution of lower thoracic or lumbar nerves, as in the case of operations involving inguinal or knee joint regions.

When the heavy preparation was used, the doses were comparable, 10 millilitres containing 6·3 milligrammes of "Nupercaine", the equivalent of slightly more than 1·3 millilitres of the 1 in 200 solution. Similarly 6·5 millilitres of the light solution and 0·8 millilitre of the heavy solution each contain four milligrammes of the active drug and were commonly used to produce sacral block.

The nature of the operations for which spinal anæsthesia was used was, as has been indicated in the previous discussion, in general limited to patients in good physical condition. Its use for recent battle casualties was felt to be unwise. However, it was extremely useful in such operations as long plastic procedures on the lower extremities, and towards the end of the war it was used almost universally for such operations as cross-legged flaps, so good were the results. It was also a great comfort to the anæsthetist in the search for metallic foreign bodies in the lower extremities.

In some operations, such as those involving the soles of the feet or toes, the anæsthesia tended to be rather unsatisfactory unless a large dose was given or adjuvants of some sort were used.

Adjuvants.

In a proportion of all cases, the anæsthesia was insufficient and had to be supplemented. This was due to several factors.

1. *Moderate Premedication.*—It was generally considered unwise to use heavy premedication, which was limited, in the almost entire absence of barbiturates, to the administration of morphine and hyoscine. It was thought that some minor adjuvant should be given if necessary.

2. *Nature of the Operation.*—The difficulty of obtaining a perfect result in foot operations has been mentioned. In an appendicectomy, for instance, the results were good in perhaps 80% to 90% of cases. Anæsthesia above the umbilicus was never aimed at, and this certainly would not cover cases in which mesenteric traction was pronounced, as in the presence of a retrocaecal appendix. In such cases, unless the operation was of short duration, some adjuvant was given. This varied. Chloroform was used in some of the early cases; but excitement and lack of cooperation were apt to cause difficulty. Morphine (usually one-quarter of a grain given intravenously) was also satisfactory; but the duration of its effect was short. When it was available, nitrous oxide with the maximum amount of oxygen was used; but "Pentothal" in 2·5% solution was found to be most satisfactory. Usually 0·5 gramme was enough.

Inhalational Anæsthesia.

Inhalational anæsthesia was used in different forms on a number of occasions; in all ether in some combination was almost universal. For such operations as circumcision (performed on a large number of occasions) it was almost always used, and also in cases in which for some reason spinal anæsthesia was not suitable. Although local anæsthesia was used widely for the operation of tonsillectomy, there were a few cases in which general anæsthesia was used. There were 42 of these in all.

Ethyl Chloride.

Ethyl chloride alone was used in over 200 cases. This may seem an anachronism by modern standards. It was the most convenient agent for short operations of a minor

character, many of them performed in the ward, and its use was confined almost entirely to the first two years of the war when "Pentothal" was in short supply. "Talking" as opposed to "snoring" anæsthesia was usually aimed at. No so-called ethyl chloride spasms were encountered, the most dramatic incident being that in which a soldier described with great clarity and no inhibitions the exact nature of his erotic dreams.

Chloroform.

The use of chloroform may well shock many. No one has more respect than I have for its potency and unpleasant characteristics; but there was in some cases no alternative. Emergency operations in tents at night, in the presence of naked lights, determined its use in a number of cases. For the operation of cauterizing warts, particularly those of the upper extremity, in the absense of "Pentothal" there seemed no other choice. This was made obvious by the presence of a raging "Primus" stove a few feet away, on which the soldering iron was kept hot. The combined smell of burning kerosene, chloroform and incinerated flesh was something very difficult to forget.

As an adjuvant to other anæsthetics, it had its uses. In regard to spinal anæsthesia this has been described. It was also used as a final despairing attempt to subdue some particularly resistant soldier on whom occasionally the effect of ethyl chloride and ether was as that of rose water. Whether, as was held in some circles, the climatic conditions were such as to make the vaporization of ether inadequate, I do not know, though such conditions seemed similar to those in Sydney. However, extreme difficulty was at times encountered in anæsthetizing patients of a strong athletic type. In such cases chloroform was used occasionally as an adjuvant, 38 times in all.

Nitrous Oxide.

Nitrous oxide and oxygen anæsthesia was used in few cases. Their small number was due partly to the limited supplies of nitrous oxide (to which the acute shortage of cylinders partly contributed), to the difficulty of obtaining easily transportable equipment for its administration with or without ether, to the inherent feebleness of nitrous oxide as an anæsthetic agent for the control of vigorous strapping males, and finally, to the dawning consciousness of the convenience, portability and generally desirable qualities of "Pentothal Sodium". There was one death with nitrous oxide.

The patient was a British sapper, who had survived numerous hazards, including a fall of sixty feet down a well in Palestine (which resulted in fractures of both femora and a fractured pelvis), as well as other injuries and operations. His death occurred during the closure of a colostomy, and was due, I fear, to imperfect appreciation of the effects of anoxia upon an already handicapped nervous system.

Cyclopropane.

Cyclopropane was used less frequently than nitrous oxide. Supplies were non-existent for long periods, and the equipment for its administration was considered by the army an extravagant and unreasonable piece of nonsense. It was held very strongly in the terminal phases of the war that the use of cyclopropane was highly to be desired in cases in which severe tissue damage had been sustained, as in severe facio-maxillary injuries or thoracotomies. By dint of buying, through regimental funds, a supply of cyclopropane and a machine for its administration, it was possible for the patients who really needed it to have the advantage of its use. Deep cyclopropane anæsthesia was held to be highly undesirable except for short intervals, and was frequently accompanied by some variety of cardiac arrhythmia, of which the commonest was coupled beats. Lowering of the cyclopropane concentration soon abolished this as a rule.

Intravenous Anæsthesia.

"Pentothal Sodium" really came into its own during this war; it was used in 1,369 cases as a total anæsthetic, and on 489 occasions as an induction agent or adjuvant to some other form of anæsthesia. It was almost invaluable for battle casualties, and in the later phases of the war no other anæsthetic agent was used except for cases in which an endotracheal tube was necessary, or cases in which cyclopropane was indicated (as for patients suffering from shock or severe toxæmia, or cases in which the thorax was opened). It was used in a 5% solution in nearly every case. The dosage varied widely. When the patient was strong and robust it was difficult to give enough to control muscular movement in response to skin stimulation. Three grammes and over were no uncommon thing in such instances, though such dosage would and should be regarded with great distrust in civilian surgery. On the other hand, although adequate resuscitation was aimed at, one had on occasion to anæsthetize patients who were suffering from the debilitating effects of blood loss, sepsis, exposure and malaria. In such cases a few millilitres of the 5% solution sufficed for the changing of plaster casts or the dressing of wounds. A rack to hold a 20 millilitre syringe with a small piece of rubber tubing and suitable adaptors was invaluable in the administration of multitudinous "Pentothal" anæsthetics. Three patients in adjacent operating theatres could thus be dealt with simultaneously by one trained anæsthetist. This may well horrify some people, but was simply a case of "needs must". Well-trained orderlies were a gift from heaven in this regard. One in particular, a seller of tea in civilian life, was superb, and his venepuncture was something to marvel at. During the battle of Tarakan we were busier than I have ever been, before or since. Operations were performed in sessions, morning, afternoon, and evening, and simplification of routine was essential. It was then found convenient to mix the "Pentothal" solution in pints rather than ounces at the beginning of the day and keep it in a sterile glass jug. A cylindrical glass container with a nozzle at the bottom, and a piece of tubing incorporating a Laurie's dripper going to the patient, eliminating the use of the syringe, was found to be useful at busy times. One of these was tied to each of the three overhead lamps in the operating theatre, and by means of a short piece of rubber tubing with suitable adaptors near the patient it was possible to prevent contamination of the main rubber tubing which could be used all day without being changed. This arrangement smacks of rugged simplicity, and is not suggested as a substitute for the syringe in civil practice; but it was extremely useful then.

Combined Anæsthesia.

Combined anæsthesia usually took the form of the administration of "Pentothal" with some form of inhalational anæsthesia, and occasionally with spinal anæsthesia. Its use in induction became for me the rule as supplies improved, and was invariable in those cases in which multiple operations were certain to be required, as the idea of repeated anæsthesia with ethyl chloride and ether was regarded with increasing dread by many long term patients having a series of operations.

As an adjuvant to spinal anæsthesia, intravenous anæsthesia has distinct virtues. They were not tested many times in the army and then only in the cases in which the patient complained of some discomfort, 0·5 gramme of "Pentothal" usually sufficing at such times. There were, however, a few cases in which intravenous and spinal anæsthesia was combined deliberately from the beginning. One of these patients had a recto-vesical fistula, and muscular relaxation for several hours was demanded by the surgeon. One gramme of "Pentothal" was used in addition to 1·4 millilitres of a one in 200 solution of "Nupercaine" with 6% glucose, and the result was extremely satisfactory, as the patient woke up and demanded food shortly after operation.

Similarly, the combination of "Pentothal" with nitrous oxide and oxygen was found to be extremely useful. By this means much less of each of the anæsthetic agents was used than as if either had been used separately, and much more satisfactory results were achieved.

Resuscitation.

The mechanism for resuscitation creaked a trifle during the first year or so of the war, but afterwards became extremely efficient. It was always the aim of those concerned to have the hæmoglobin level at or above 12

grammes *per centum* before operation, and transfusions in the operating theatre could always be arranged quickly where it was thought necessary. If blood was already running in, the tubing was used for the injection of "Pentothal", and if the transfusion was begun by me in the operating theatre it was usual to insert a needle into a vein in the arm. On one or two occasions when all other veins were inaccessible or unavailable, the femoral vein just below the inguinal ligament was used if the patient was very ill.

During the latter years of the war it was possible to have serum ready for injection at a few minutes' notice and blood with little more delay. Dried plasma was also available latterly and was used as an emergency measure on a number of occasions.

Nature of the Surgical Procedures.

The nature of the surgical measures has already been discussed to some extent in the session on spinal anæsthesia. It is not without interest, however, to mention the types of surgery performed with different forms of anæsthesia. Cholecystectomy was performed on 26 occasions; on two of these it was associated with other operations. Splenectomy was performed three times. Varying types of abdominal exporation were performed 20 times. The operation for inguinal hernia was performed 493 times. Eight hundred and twenty-six operations for appendicectomy took place with different forms of anæsthesia, in over 50% the anæsthesia was spinal. Hæmorrhoidectomy was performed on 202 occasions, and on 169 of these spinal anæsthesia was used. On the other hand, the removal of malignant neoplasms was extremely rare, and such operations were performed in the base hospitals as a rule.

Of great interest were the traumatic surgery and the nature of the anæsthetic problems entailed. Patients who had suffered gross destruction of tissues of the face and mouth, in particular one man whose jaw had been almost completely obliterated as well and whose larynx was visible from the outside, gave one pause to think. In many of these cases intubation with "Pentothal" and maintenance of anæsthesia with some form of inhalational agent was the only possibility. In the one mentioned a large cuffed tube was inserted through the nose and the anæsthesia was carried on with a light concentration of cyclopropane. In the earlier days of the war, particularly in New Guinea, when no cyclopropane was available, in all cases intubation was carried out and anæsthesia was induced and maintained with "Pentothal" alone. The reason for this was the difficulty in supply of nitrous oxide and the machines for its administration. In all, in 30 cases "Pentothal" alone was used. It was found that on an average one gramme was required for the intubation and for control of the resultant coughing. The average total dose was high, too—2·2 grammes in these cases. This has obvious disadvantages which were fully recognized at the time—mainly, prolonged post-operative sleep, with the possibility of chest complications. The average post-operative sleep lasted for six hours, the longest lasting for eighteen hours. By sleep is meant the duration of the interval before the patient could stay awake fully. The advantages of all-"Pentothal" anæsthesia were chiefly the absence of post-operative vomiting (which for many patients with facio-maxillary wounds was vital, owing to the wiring together of upper and lower jaws with or without splints) and the post-operative sedation of the patients, many of whom had had insufficient sleep from pain and exposure.

There was one death in this small number of cases, making a total of two in all.

The patient was a New Guinea native with an old fracture of the jaw. After an operation lasting less than one hour, involving the injection of two grammes of "Pentothal", he left the operating theatre in good condition, but died suddenly about three hours later. There appeared to have been no respiratory obstruction, and the cause of death, unfortunately never confirmed by post-mortem examination, was assumed to be cardiac, though this necessarily must remain conjectural.

Complications and Sequelæ.

Complications and sequelæ have been dealt with to some extent in the discussion on spinal anæsthesia. Accurate figures as to the percentage incidence of any particular sequel are not available; but chest complications were regrettably common. They occurred much more frequently when the abdominal wall was involved than in operations on other parts. Hernial repair and appendicectomy carried a high incidence. It was striking that the incidence of such sequelæ in operations on the extremities and in those involving sacral areas was practically nil. Such complications usually took the form of recrudescence of preexisting bronchitis or of frank atelectasis followed by pneumonia. The latter was infinitely more common than the former. The whole picture is too familiar to justify a detailed description; but it should be mentioned that in the vast majority of cases the onset was in from twenty-four to forty-eight hours. Most patients settled down within a few days with complete disappearance of signs and symptoms, but some developed full-blown pneumonia which took longer to resolve. In some cases a few residual signs remained. One patient developed pneumonia following atelectasis, after the removal of his gall-bladder. Signs in this case persisted, so that the patient had eventually to be sent home to Australia as being unfit for military service.

Prevention of chest complications was one of the constant preoccupations of army anæsthetists. An attempt was made to induce the men to stop smoking for twenty-four hours before operation; but this was soon found to be impracticable owing to the soldiers' passion for tobacco. Considering the few amenities they enjoyed and the general dreariness of their life, which in many cases was all too short, one could hardly have the heart to blame them. A policy of post-operative activity and movement in the bed was always aimed at, and during the later years of the war this became more stringent, as it was realized from repeated experience that the act of coughing, when completed, uncontrolled and uninhibited, was probably more valuable than any other factor in the treatment of the condition. It was undoubtedly cruel, but not so cruel as the performance of bronchoscopy; moreover, there are those who say that the beneficial effect of bronchoscopy is largely a matter of precipitating a vigorous cough which, by the accompanying contraction of bronchial muscle, moves into the trachea or one of the larger bronchi the plug of mucus distal to which lies the atelectatic patch. Whatever the cause, it was found in many cases that the act of sitting the patient up, exerting firm general pressure on a pad over the wound to alleviate the feeling of instant bursting open of which most complained, and then making him give a really full-throated cough, would produce a modicum of sputum, and often also a startling change in the physical signs, and that his condition would improve remarkably as a result.

As a large proportion of the patients in question had a preexisting cough from tobacco or dust or both, it will be seen that the predisposing causes were well in evidence.

Post-anæsthetic vomiting was naturally most common after ether, but occurred occasionally after spinal anæsthesia, and even sometimes after "Pentothal". Apart from the cases of aseptic meningitis referred to elsewhere, it was rare and never very prolonged.

Headache and backache are predominantly sequelæ of spinal anæsthesia and were well recognized as such by the soldiers. These complications also have been discussed elsewhere. Discreet interrogation revealed the fact that they both occurred on occasions after other forms of anæsthesia, but were never then considered significant.

Acknowledgements.

No account of anæsthetics in the army would be complete without mention of the cooperation of all members of the operating theatre staff in many different places and conditions. Particular reference should be made here to the help from people previously untrained, or trained for work of a completely different character. To members of the Australian Army Medical Women's Service, to the many orderlies who worked with me, and to those who have listened to me today, I give my thanks.

Summary.

1. In all there were 5,207 cases in which anæsthetics were given. Of these, 1,884 were spinal, 1,438 were given by inhalation, 1,396 were given by the intravenous route, and 489 represented some combined form of anæsthesia.

2. A general résumé of the techniques used has been given, and reference has been made to various anæsthetic complications. Meningeal reactions with spinal anæsthesia and chest complications occurring with different types of anæsthesia have been discussed. The use of chloroform for "good risk" adult male patients has been mentioned. The nature of the surgical measures with particular reference to those required by battle casualties has also been mentioned.

3. There were two deaths in the series which could reasonably be attributed to the anæsthetic.

THE TEACHING OF ANÆSTHESIA.[1]

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THE object of this paper is to advocate uniformity in our teaching on anæsthesia to medical students, and to provoke discussion to secure this end. The requirements in anæsthetics for the medical course are laid down by the university authorities concerned, so that any alteration here is a matter of hopeful recommendation to them and lies outside our immediate scope. However, the actual teaching that the student receives during the administration of the necessary number of anæsthetics is the province of his teacher alone. It is obviously desirable that there should be uniformity not only in the practical details but also in the emphasis laid on the various guides to the progress of the anæsthesia. One has only to question students even within one clinical school to find great variation in teaching and consequent perplexity among those who have been taught by more than one instructor.

The regulations state that so many administrations must be carried out by the student under supervision. The nature of the anæsthetic is not specified. It has been advocated that patients should be given the benefits of recent progress, and that to this end students should be taught the use of the gases, "Pentothal Sodium", spinal anæsthesia and so on. Unfortunately this is not at present practicable. For instance, in Melbourne the student need carry out only six administrations before qualifying—surely not a large enough number to gain skill with any one method, let alone several. It is true that we occasionally come across a rare enthusiast who administers many more anæsthetics; but the average student administers only the statutory number. The instruction, therefore, should be confined to one method and one drug.

When we consider the combined safety factors of drug, method and inexperience, we must, I think, concur in the choice of "open ether" for student teaching. It must be remembered that the recent graduate is not only legally qualified to induce anæsthesia without supervision, but as a resident medical officer, assistant, or *locum tenens* he is almost immediately compelled to do so in many cases. No other procedure than the use of "open ether" would permit this—the immediate mortality rate would be too high. I would further plead that the term "open ether" be used in the primitive sense—that is, ether should be used for induction as well as for maintenance of anæsthesia, without the use of added carbon dioxide. No doubt there will be many objections to this: it is a retrograde step, it is barbarous and time-consuming. From the patient's point of view, however, a skilful ether induction is little worse than well-given ethyl chloride. The smell of ether is not long perceived on account of rapid tolerance by the nasal mucosa, and I have seen just as many patients choking and gagging when ethyl chloride was used. The latter certainly produces unconsciousness more quickly; but its very potency is an added danger, and the tendency to spasm with its use makes the change-over a matter of considerable skill. It is my opinion that maintenance of anæsthesia is smoother after the average ether induction than after the average ethyl chloride induction. The alternative to the use of ethyl chloride is the addition of carbon dioxide, and the drawbacks to this are well known; they are the sudden attainment of dangerously deep anæsthesia, the awkward apnœa, and the depressed cyclic or irregular breathing which too often follows.

My conclusion is this: let the student perform his six administrations using ether only. He then has some skill in the safest method we know for the relatively inexperienced. Later, preferably as a resident medical officer, he may learn more pleasant but more risky techniques provided he remembers the fundamental principles which should have been instilled into him as a student.

To reduce the proposition to the concrete, let us suppose that you yourself have a perforation of a peptic ulcer while you are in a country town. The surgeon is the town's only general practitioner; the anæsthetic must be administered by his assistant, who is just qualified, and who has administered only six anæsthetics in his medical life. You will be his seventh patient for anæsthesia; what anæsthetic will you demand? I have no doubt that "open ether" will be the answer.

If the student is to be taught the use of any other method or drug, this instruction must be supplementary to his training in the administration of "open ether" and not exclusive of it. In fact, if he has opportunity for more than his necessary number of administrations, he would do far better to continue his training in the use of ether and the well-manifest signs of anæsthesia produced by it.

There is considerable room for standardization of the actual details of the administration of ether by the "open" method; there is also a wide lack of appreciation of the physical principles involved. Both these factors are difficult to overcome. My personal preference is for a completely open mask resting on a gamgee tissue facepiece of adequate size. When the state of anæsthesia permits, I strap the eyelids down with small strips of adhesive plaster and run a trickle of oxygen under the mask. It is not generally appreciated that in the maintenance of anæsthesia, the ether vapour concentration may be about 10%. This reduces the oxygen concentration of the inspired air from its normal 21% to 19%. Add to this the effect of rebreathing and mask dead-space, and the final oxygen level may fall as low as 15%. I am convinced that the routine use of a trickle of oxygen gives a better anæsthesia and better recovery. However, I am well aware that the main necessity is to convey the requisite amount of ether vapour to the patient, and that this can be done effectively with all sorts of "set ups" ranging from "cages" to "turbans".

From the student's point of view, the chief difficulty seems to be the determination of the depth of anæsthesia, and indeed here he is in a quandary. Even Guedel's masterpiece will not give him the help he needs. In effect, he is taught how to tell when the anæsthesia enters the third stage and when it becomes too deep—that is, in the third plane, with the onset of intercostal paresis. During the whole range of anæsthesia from when his patient becomes fit for minor surgical procedures to when his patient is too deeply anæsthetized for ordinary work, the student has no positive guide. His instructor rightly tells him that the pupils give unreliable signs until some considerable time has elapsed, and then only if their activity is not interfered with by premedication or the patient's age. He himself soon finds that with "open ether" the first plane sign of eyeball oscillation is seldom seen except during recovery, and he is given no other guide to help him. It is clear then that we must reduce our impressions of the phenomena of the first and second planes of the third stage of anæsthesia to a description which the student can apply.

The behaviour of the pupils is well known, and cannot be further amplified. On the other hand, a study of the breathing will give us the information we need. The

[1] Read at the annual meeting of the Australian Society of Anæsthetists (British Medical Association) on April 15, 1947, at Adelaide.

details of respiration have been much neglected in the literature, and many gross inaccuracies have been perpetuated. More commonly, incomplete description is to be found. Thus, Boyle, in his textbook of 1911, has only the following statement to make about respiration:

> During the early stages of the administration, the respirations are increased both in rate and amplitude until they become deep, regular and noisy.
>
> The signs of an overdose of ether are—
>
> 1. Failing respiration: the breathing becomes more and more feeble, the expiration prolonged and wheezy, the inspiration short and jerky.

Probably the word "noisy" is used to indicate the large tidal exchange of the first plane with ether, rather than to suggest that Boyle was tolerant of an obstructed airway.

In a textbook of 1919, J. Stuart Ross comes much nearer to the mark when he makes the following statement:

> In open ether anæsthesia particularly, expiration commonly assumes a "blowing" type very characteristic, and which to the trained ear is of itself an indication that full surgical anæsthesia is present or at any rate not far distant.

Here the active expiration of the lighter planes is clearly described. Similarly, Nosworthy, in 1935, wrote as follows:

> It has been said that the breathing becomes rhythmical on entering the third stage and then progressively shallower until it finally ceases in the fourth. Thus, the length of the expiratory phase in conjunction with the respiratory rate will show the level of narcosis: hesitant or quick breaths point to incomplete anæsthesia.

Again, it is the activity of expiration which is to be noted.

The publication of Guedel's "Inhalational Anæsthesia" in 1937 was one of the milestones of anæsthetic progress; but the work has its defects. Concerning the breathing, Guedel makes the following statement:

> Inspiration is an active process, depending on the contraction of skeletal muscles. Hence there are great variations in the character of inspiration. Expiration is passive, resulting from the relaxation of the contracted muscles of inspiration, and the elasticity of lung tissue. Hence there are few variations in the character of expiration.

Guedel goes on to state that "there is no particular change in the character of respiration as anæsthesia passes into the second plane", and that in the third plane "the pause between inspiration and expiration grows progressively longer, at the expense of the shortening inspiration".

This belief that there is no particular change in the character of respiration between the entry into the third stage and the entry into the third plane of that stage is not correct. In June, 1945, J. Y. Morton, in the *Proceedings of the Royal Society of Medicine*, made the only satisfactory reference I have been able to find. His statement is as follows:

> One relatively neglected aspect of respiratory activity is the study of the changes which occur in the *nature* of *expiration* and particularly the *force* of expiration during anæsthesia. Inspiration is an active process depending, chiefly, on the activity of the intercostals and diaphragm. With each inspiratory movement the muscles of the anterior abdominal wall relax sufficiently to provide room for the displaced viscera as the diaphragm descends. "Passive" expiration is effected by a combination of the "elastic recoil" of the thoracic walls and actual muscular control (Keith, 1909). Increasingly "active" expiration involves increasingly powerful contractions of the abdominal muscles. The force of expiration is clearly a very variable quantity.

Morton goes on to describe experiments relating the respiratory pressure as measured in the breathing bag to tidal volume, depth of anæsthesia, and other less important factors. Referring to open ether, he makes the following comment:

> Open ether as usually given causes active expiration at the onset of anæsthesia. Careful observation of abdominal movements makes it clear that "passive" expiration does not as a rule take place until considerable relaxation has been produced. It is not difficult to imagine the force of expiration corresponding with any particular degree of visible expiratory effort. The inexperienced student giving open ether to an abdominal case should bear in mind that spontaneously active expiration means a tight abdomen. Passive expiration succeeding active expiration, despite surgical trauma, means a relaxed abdomen. In the majority of cases the force of expiration offers the student a progressive sign giving information about anæsthetic depth and abdominal relaxation, irrespective of the nature of inspiratory activity.

When "open ether" is being used without heavy sedation, as it should be, the estimation of the activity of expiration is the most valuable single guide to the conduct of the anæsthesia.

It must be remembered that "active" expiration includes both the forcible "blowing" expiration described by Ross and the "hesitant" restrained expiration referred to by Nosworthy. In both cases there is muscular effort during expiration—either active contraction of the expiratory muscles or delayed relaxation of the inspiratory muscles. It is difficult to give a name to this state of affairs; one might almost say that the patient still had control over his expiration. The breath-holding which may occur prior to entry into the third stage of anæsthesia has become modified into an exhalation in which the air is slowly let out of the chest, and the cough has changed into a forcible exhalation to get rid of the irritating vapour. Either type may occur, and each is of equal significance. The greater the tidal exchange, the more likely is expiration in the first plane to be aided by contraction of the abdominal muscles. As anæsthesia deepens, the abdominal muscles become relaxed and can no longer aid expiration, so that at the end of the second plane the expiration has become passive. Relaxation of the muscles of inspiration now occurs rapidly in the expiratory phase, which can henceforth be little changed as anæsthesia deepens. The subsequent shortening of inspiration and occurrence of intercostal paresis are well recognized.

In teaching students, I have tried to build a reasonable basis for all the signs to be looked for and used as guides to the level of anæsthesia. As a prerequisite, great importance is attached to the maintenance of the maximum airway and oxygenation possible, and it is pointed out that anoxia not only harms the patient but falsifies the signs of anæsthesia. I propose to recapitulate briefly what the student is told, so that you may consider the suitability of such a scheme as a groundwork for eventual uniform teaching, and I ask you to remember that I deal only with "open ether", which I believe to be the most suitable for student use.

Ether has two main effects upon the body—central and peripheral. The obvious central effect causes ultimate loss of consciousness after a period of excitability. Next there is a phenomenon which is not strictly central, but which finds its place here. The action of the ether vapour on the sensory endings concerned in the Hering-Breuer lung distention reflex causes a heightened activity of expiration, at the same time as the direct action of the ether on the respiratory centre creates a relative hyperpnœa. There follows a release activity of the occipital cortex giving rise to the eyeball oscillation which is sometimes seen in the first plane of the third stage. Increasing ether levels later depress the respiratory centre so that eventually, at the beginning of the fourth plane, the respiration becomes irregular, and it ceases altogether in the fourth stage.

The peripheral effect with which we are concerned occurs at the myo-neural junction, and causes a weakening of the muscular action according to the ether concentration. Not all muscles become paralysed at the same level of ether in the blood. If this were so, we could not relax the abdomen without stopping the breathing and the heart. As it is, the limbs, neck and jaw relax first, the abdomen next, and the breathing muscles last of the voluntary group. The heart maintains its beat even when breathing is stopped. Roughly speaking, the muscles of the limbs and neck are relaxed at the bottom of the first plane of the third stage, those of the abdomen at the bottom of the second plane, and the intercostal muscles at the bottom of the third plane.

It is arguable whether the cessation of diaphragmatic respiration is generally due to central failure or to paresis. I believe that the effect of premedication is an important predisposing factor in early central failure.

The student is warned that the effect of anæsthesia on the pupil is both delayed and variable, and moreover, that it is preferable that the patient's eyes should be kept closed to prevent trauma from facepiece or ether. Of course, if the student is in doubt and wishes to gain all possible information, he may inspect the pupils, but he is not encouraged to do so. His main guide, then, to the depth of anæsthesia is the respiration. It is pointed out that for practical purposes all the muscles of the anterior plane of the trunk and neck are in a sense muscles of respiration. This may seem far-fetched; but consideration shows that on inspiration the abdominal muscles relax to permit the descent of the diaphragm, and on expiration of any force they squeeze the abdominal viscera upward and narrow the lower part of the thoracic cage. The muscles above the cricoid cartilage contract during inspiration to prevent downward movement of the upper part of the trachea in response to the tug of the diaphragm. Paresis of these muscles gives rise to an inspiratory "tracheal tug" beginning at the third plane. It is interesting to note that once the "tracheal tug" has been started by deepening of the anæsthesia, it is apt to persist back to a lighter level than that at which it began.

The student is told to follow the patient's breathing with his own so that he may determine its rhythm, depth and activity. The activity of expiration is often best seen by watching the upper part of the abdomen and the flanks, especially at the end of expiration. The prolonged and active expiration is often seen when it cannot be heard. Also, the student must watch and feel the trachea for "tracheal tug", and the upper part of the chest for intercostal paresis. Then, in the first plane of anæsthesia he finds regular respirations of greatly increased depth, active expiration, no tracheal tug, and no intercostal paresis. In the second plane, the depth of breathing is less, abdominal contraction decreases, and the expiration becomes at last truly passive. The third plane is marked by the onset of intercostal paresis, by "tracheal tug" and by a shortening of inspiration from the unaided action of the diaphragm. Expiration is passive and practically unchanged, but is relatively longer. The fourth plane is indicated by irregular, gasping breathing, wholly diaphragmatic in type.

Next, the effect of obstruction in simulating the "tracheal tug" and intercostal paresis of deep anæsthesia is demonstrated on the anæsthetized patient, and it is emphasized that an estimate of depth of anæsthesia must not be made on the evidence of one sign alone. If doubt exists, the effect of removing the mask is to be watched. Mention is made of the respiratory response to skin incision or other surgical stimulation, which generally produces no effect when anæsthesia is below the second plane. An exception here may be made in the case of the subdiaphragmatic reflex. Then, after the so-called Gill's law has been discussed, the student is ready to begin an administration.

Before he has completed his six anæsthetic administrations, he has generally realized the fact that the ether-greedy neurones may become saturated before the muscles show a corresponding paresis, and that planes of anæsthesia are not black lines ruled across the patient's physiology, but rather uneven responses to the drug the student is giving. If he learns caution and a respect for a free airway, I consider that he has done well. However, what I want to emphasize is that most students readily grasp and practise the idea of using the change in expiratory force from fully active to passive as their guide from the beginning of the first plane of anæsthesia to the end of the second, and regard the signs of the third plane as danger signals.

At present, our knowledge of the mechanism of the signs of anæsthesia is insufficient, and we find many inexplicable variations from the normal progress. Some of our definitions are not exact enough. For instance, in severe shock or after heavy premedication, respiration may cease before the intrinsic muscles of respiration are seriously affected. When respiration ceases and does not spontaneously recur, then by definition the anæsthesia has reached the fourth stage. If intercostal paresis has not occurred, then by definition we have not reached the third plane of the third stage. In the same way, an overdose of "Pentothal Sodium" stops respiration after a progressive diminution of respiratory excursion as a rule without obvious chest retraction or irregular gasping breaths. How, in this case, can we recognize planes of anæsthesia?

The increasing use of curare in conscious or at least unanæsthetized persons may enable us to estimate by analogy the effect of anæsthetic drugs on the muscles, and by exclusion, their effect on the central nervous system. It has been found that a certain level of curarization in the conscious or lightly anæsthetized patient may cause irregular spasmodic contractions of the diaphragm as the sole remaining respiratory effort. This suggests that the irregular gasping respirations of the fourth plane of anæsthesia may not be wholly due to interference with the respiratory centre. Unfortunately, the details of the mechanism of the action of curare and anæsthetics on the myo-neural junction are not yet known. Probably investigation of action currents may be of help. We may yet know whether the sign of entry into the second plane —cessation of eyeball oscillation—is due to muscular paresis or to interference with the occipital cortex or lower levels. However, this is mere speculation at present, and does not strictly concern us. What is to the point is this—that we should try to analyse our sensations during the conduct of anæsthesia. Probably most of us maintain our patient in anæsthesia at a given level without actually defining the clues that guide us. If asked to do so, we might be hard put to it to give a satisfactory answer. What I suggest is that we each try to crystallize our experience in these matters into words that the student can comprehend, and that by pooling our conclusions we may arrive at a satisfactory standard method of teaching. That which is available in the textbooks is not good enough in dealing with the most useful levels of anæsthesia.

For the purpose of assessing signs, I would further suggest that you renew your acquaintance with true "open ether". Use an ether induction with the care that you now apply to more advanced methods. Use no pre-anæsthetic sedative or at most a very mild one. Observe closely the changes in respiration as the anæsthesia deepens, and then reduce your impressions to written words. This is not easy, but it must be done satisfactorily before we can give students the instruction they should receive.

Summary.

1. Standardization of and improvement in the methods of teaching of anæsthesia are advocated.
2. A suggested basis for instruction in the signs of anæsthesia is given.
3. A plea is made for a coherent and detailed analysis of the signs of anæsthesia.

Reviews.

A YEAR BOOK OF UROLOGY.

THE field of literature on urological subjects published during the year ending August, 1946, is well covered in "The 1946 Year Book of Urology".[1] The editor, Oswald S. Lowsley, after dealing with papers on "General Considerations", groups the remaining material according to anatomical subdivisions of the genito-urinary system, with a short concluding section on gonorrhœa. The section devoted to general considerations begins with a very mixed group of papers ranging in subject matter from a report of three cases of Reiter's syndrome to a discussion on the management of anuria; several authors consider aspects of the X-ray investigation of the urinary tract, including "a

[1] "The 1946 Year Book of Urology", by Oswald S. Lowsley, M.D., F.A.C.S.; 1947. Chicago: The Year Book Publishers, Incorporated. 7" × 4½", pp. 392, with many illustrations. Price: $3.75.

urethro-cystographic study in the male with special regard to micturition"; the use of a new plastic cast material is suggested to protect the operation site in such procedures as plastic operations on the genitalia or bladder in infants; chyluria and paroxysmal cold hæmoglobinuria are also mentioned. Subsections are allotted to abacterial pyuria, congenital anomalies and their correction, infections (the value and dangers of streptomycin receive special attention) and calculi (particular reference is made to ætiological factors). The section devoted to the kidney and adrenal glands contains interesting material. Nephroptosis and its surgical treatment are the subject of a series of papers; anomalies, injuries, calculi, tumours and infections occupy separate subsections; hypertension with its surgical treatment (in the form of adrenalectomy, nephrectomy, thoracolumbar sympathectomy and splenorenopexy) receives a good deal of attention, though the general surgeon and neurosurgeon may question the urologist's right in this field. Papers on acute hæmorrhagic adrenalitis, backache due to carcinoma of the adrenal cortex, and pheochromocytoma of the suprarenal area make up the subsection on the adrenals. Perinephric abscess is always of interest; three cases simulating acute appendicitis are reported and another in which the abscess contained a toothpick; X-ray diagnosis is helpfully discussed, and a case is recorded in which penicillin alone cured a patient who on clinical grounds should have required surgical intervention. Anomalies, obstruction, calculi and tumours of the ureter are considered, with detailed accounts (including many diagrams) of some intricate surgical procedures devised for this structure. A wide variety of papers are considered in the section on the bladder; diverticula, infections, calculi and tumours form the main subheadings; in a subsection on instruments, a new "boilable" cystoscope is described; abnormalities and carcinomata of the urachus are considered. The surgery of the prostate occupies a good deal of attention; enthusiastic reports are given of the value of transurethral resection, thrombin for the control of bleeding and penicillin and sulphonamides for the control of infection having contributed largely to the good results. The section on the genitalia includes papers on subjects ranging from infertility in the male to the surgical treatment of varicocele; yet two more methods of performing circumcision are described; a review of the world literature on incarceration of the penis reveals some remarkable cases; ingenious contributions to the surgery of the urethra and penis are described; the endocrine and surgical management of undescended testis is considered at some length; a paper is reviewed in which it is asserted that the atrophy of the testis that often follows mumps is due to an acute hydrocele and may be prevented by early surgical drainage of the hydrocele. In the section on gonorrhœa a study is presented on gonococcal urethritis produced experimentally in volunteer subjects and a number of papers are reviewed dealing with treatment by means of sulphonamides and penicillin.

The editorial contribution (in words) to this volume is very slight, but a wide selection of material appears to have been made. The index of the subject matter is detailed and is supplemented with the customary index of authors. The general production and printing are of the usual high standard of the series. This book can be confidently recommended to urologists and to general surgeons and others interested in urological problems.

A CHILDREN'S HOSPITAL PHARMACOPŒIA.

A NEW edition of "The Adelaide Children's Hospital Pharmacopœia", described on the title page as a children's formulary and medical handbook, is a conveniently sized pocket volume containing a wide range of prescriptions together with statistical and other information on a variety of aspects of pædiatric practice.[1]

The formulary has obviously been the subject of much thought and care; but while many of the prescriptions reflect the simplicity and directness of present-day usage, others are reminiscent of the complexities that masqueraded as pharmaceutical elegance in a former generation. Even for presentation to a medicine-resistant child, many of the mixtures appear to be overloaded with multiple flavours and aromatic preservatives. However, the complexity reaches its maximum in the creams, some of which carry an unnecessary mixture of emulgents and a multiplicity of "fillers", which merely complicate dispensing without therapeutic advantage. Surely therapeutic efficiency and pharmaceutical excellence are not incompatible with economy both of the ingredients used and of the time and effort essential for dispensing them. An indication as to whether the finished creams with their many components are ultimately oil-in-water or water-in-oil emulsions would be a help to the discriminating prescriber.

The nomination of glyceryl monostearate as an emulgent without specification of the self-emulsifying grade may possibly lead to dispensing difficulties, but as the self-emulsifying grade contains an appreciable quantity of alkaline soaps, the advisability of using this as a vehicle for penicillin is open to challenge.

We are sorry to note that the term "pulvis" is specifically used in this formulary to indicate a powder "for external application to a surface or into a cavity". This contravenes a widely adopted convention which reserves the term "pulvis" solely for powders designed for oral administration. Other terms are now in common use to differentiate powders for external use. On looking through the very comprehensive index added as a new feature in this edition, we are surprised to note the absence of such drugs as filix mas and calomel.

"The Medical Handbook", which occupies something less than half the volume, remains practically unchanged, except for an article on infant feeding. Under this heading, notes have been added concerning milk modifications for artificial feeding together with several new recipes. Much useful information in summary form is available with regard to normal standards for blood and cerebro-spinal fluid, calorific requirements at different ages, current hospital practice with reference to biochemical, pathological and bacterial examinations, blood transfusion with Rh incompatibility as a complication, dietetic *régimes* in a variety of children's diseases and many other cognate subjects of interest.

Despite our critical evaluation of some aspects of the formulary section, both student and general practitioner will find useful and readily available information within this small brochure.

[1] "The Adelaide Children's Hospital Pharmacopœia: A Children's Formulary and Medical Handbook"; Fourth Edition; 1946. Adelaide: The Children's Hospital, Inc. 5⅛" × 4¼", pp. 174. Price: 5s., post free, from the Pharmacy Department, Adelaide Children's Hospital, Inc., North Adelaide.

PRACTICAL NURSING.

"BASIC SCIENCE IN NURSING ARTS", by Sister Mary Agnita Claire Day, is a very comprehensive and practical textbook covering all phases of nursing, and the fact that the second edition now appears within four years of the first proves the value of the work.[1] Nursing techniques are essentially the same everywhere and differ only in minor matters, and so nurses in this country will find the book just as useful as those in the United States, for whom it was primarily written. Unlike many modern nursing textbooks, this one does not waste space on details which are more the concern of the doctor than the nurse, but very full details of practical nursing are given.

Chapters on special aspects of nursing, such as the care of mental patients, of patients in an orthopædic ward and of patients undergoing operations on the genito-urinary tract, ensure that these subjects are fully described.

The book is illustrated by many excellent photographs and diagrams, and where necessary clear tables are set out. For any nurse who needs a useful and practical book on her work we can recommend this one.

THE DENTAL ASSISTANT'S HANDBOOK.

AN efficiently organized professional practice requires the efficiency and dependability of all associated with that practice. The more highly trained and busier a practitioner, the greater reliance he must place upon others for the detail of practice management.

In a small volume Gertrude West[2] quite admirably indicates how dental assistants may take pride in their avocations, the feeling for which should be upon an intelligent and personal basis. The chapters on radiology, instruments and relationship to patients are particularly good. The author creates the idea of responsibility to employer, the public and the employed in a very desirable and commonsense way.

[1] "Basic Science in Nursing Arts", by Sister Mary Agnita Claire Day, S.S.M., R.N.; Second Edition; 1947. St. Louis: The C. V. Mosby Company. 8⅛" × 5⅛", pp. 726, with illustrations.

[2] "The Dental Assistant's Handbook", by Gertrude I. West; 1946. London: William Heinemann (Medical Books), Limited. 7¼" × 4¾", pp. 118, with illustrations. Price: 6s.

The Medical Journal of Australia

SATURDAY, AUGUST 30, 1947.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

MUSIC AND PERSONALITY.

OCCUPATIONAL THERAPY in its widest sense concerns both bodily and mental activity. The latter, of course, presents an extremely wide field, covering intellectual and emotional aspects, both of which must be considered in trying to bridge the gap between the incapacitating stages of illness and the resumption of the full work of every day. Music as part of the environment of patients regaining physical and mental strength has been in the past regarded as purely diversional, but it can be made more than that. There is a certain danger that in spite of the great influence radio broadcasting has had in educating the public's musical taste, the auditory mechanism of man is becoming blunted by the ceaseless flow of "background" music and the like. A radio station which does not hesitate to cut off the last page of music which is delighting thousands of listeners will fill in other fractions of time with meaningless fragments of irrelevant recordings. Owners of sets will, on the other hand, allow them to continue to emit *fortissimo* broadcasts all day, unheeded except by the suffering neighbours. It would seem that the dice are loaded against the would-be musical therapist, but none the less music is today part of the environment of the physically and mentally ailing, and it is right to know something of the influences with which we surround them. Margaret Tilly, who is a music therapist in a Californian clinic, makes an interesting psychological analysis of musical composers and divides them into two distinct groups, according to the masculine and feminine qualities manifested in musical composition.[1] These qualities she relates to the personalities of the composers and to their patterns of life.

Admitting that all the great composers have been men, Tilly follows Jung's hypothesis that the feminine side of man, or "Anima", is usually suppressed, remaining in the unconscious, but that when it is overstrong, and not projected onto a woman, a neurotic state is caused, the personality showing homosexual characteristics. She defines the masculine qualities in a musician as form, impersonality, directness of approach, drive, rhythmic power, sustained thought and emotion, superior thinking, and a great output of large works. The feminine qualities contrasting with these are mood, personal approach, indirection, sentimentality, melodic and harmonic rather than rhythmic power, labile emotions, an essential love of decoration, and a small output of smaller works. The composers she selects to exemplify these two groups conform to these characteristics very well, with regard to both their personalities and the music that they produced, though the parallel is not exact. In the feminine group she places Chopin, Tschaikovsky and Liszt, and in the masculine Bach, Händel and Beethoven. Contradictions are not difficult to find. Chopin, in spite of his pronouncedly feminine type, yet did produce some music of power and decision; Liszt, despite his over-emotional life, made a revolution in the range and power of piano technique, and showed occasional capacity in his orchestral works for sustaining a high mood; Tschaikovsky, notwithstanding his hysterical make-up and excessive appeal to sentiment, possessed remarkable tenacity and was a hard and methodical worker. It is one of the puzzles of the human mind to comprehend how the terrible despair and utter defeat of his Pathétique Symphony should be expressed with such mastery of form and great grasp of orchestral technique. It is curious, too, that this work should be so popular among listeners who do not always appear to assimilate its emotional content. But then, no man knows his brother. Bach was certainly masculine in all ways, yet ornament he loved. It is curious that some of the devices which he uses to adorn solo passages in great works like the St. Matthew Passion are similar to others used by Wagner in "Tristan and Isolde", a great work of passion in a different sense. Händel is hardly so good an example; some of his work was over-ornamented, and his womanless and not fully integrated life was hardly masculine in all ways. Beethoven was, of course, of giant mental and emotional stature, in spite of his rebellious temperament, or perhaps because of it. Other composers might be hard to place. Of Sibelius there would be no doubt, his musical mind and life are dominantly masculine; and surely Mozart and Schumann, too, despite contradictions. Rachmaninoff lacked the masculine drive, and probably Franck also, but what shall we say of Debussy, poet and scientific experimenter in sound vibrations and their effect on mind and heart? After all, personalities cannot all be pigeon-holed. We can recognize certain predominant types, not only in masculinity or femininity, but in many other traits of personality and character, just as we may trace these in the art forms that often but not invariably reflect them.

In Australian hospital practice it is probably true to say that little trouble has been so far taken except to provide listening facilities, the patient either pleasing himself what he hears, or resigning himself to what comes. Some definite effort has been made by some broadcasting stations to provide special hospital sessions, the items being chosen by the patients themselves. This plan might be further extended with advantage; but where facilities exist for playing recorded music or presenting musicians in the flesh for the benefit of the sick, some under-

[1] *The American Journal of Psychiatry*, January, 1947.

standing and discretion are desirable in the choice of programmes. In music, as in literature and pictorial art, there are varieties which exalt and those which degrade. It surely is not necessary that musical medicine must be unpleasant, and it is good to think on the things that are lovely, as Saint Paul so memorably said.

LONDON HOUSE: AN APPEAL.

IN 1930 a group of Englishmen founded London House in Bloomsbury as a hostel where students from the British Dominions could reside while they were carrying on their studies. Not only does London House provide a residence for students; it is equipped with a library and common room and with a dining room. The students live in a collegiate atmosphere which is helpful to them in their studies; they also meet students from different parts of the British Empire, and this is of value in that it helps to remove what was described recently as "a blanket of ignorance" of one Empire community about another. The late John Curtin is stated by *The Sydney Morning Herald* as having used the following words about London House when he was Prime Minister of Australia:

> A house such as this in the capital city of the Mother Country, where students of all parts of the Empire can meet, should prove an important factor in the strengthening of Empire ties. It has already contributed much in this way, and the completion of the building, affording greater facilities, should do much to further this intercourse between students.

Between 1930 and the beginning of the recent war it is estimated that more than 800 students stayed at London House; many of these were Australians. During the war some seven thousand officers of the forces, including some from Australia, found accommodation within its walls. London House suffered serious damage during the war, but it is nevertheless functioning as before. As a matter of fact the demand for accommodation has far outrun the capacity of the existing buildings. Rebuilding has become necessary, not only to replace the accommodation destroyed by enemy action, but to provide additional rooms. It is intended to make provision for a certain number of married students to be accommodated in the new quarters with their wives. Field Marshal Smuts has written that London House should become "a monument to our brothers-in-arms and a symbol and centre for continued brotherhood in peace". He said that he could conceive no more appropriate memorial or one more welcome to the future generations of young men. The Council of Governors has decided that it will be necessary to raise the sum of £725,000 to equip London House for its post-war activities. The plans that have been adopted involve the erection of buildings capable of accommodating three hundred students. The sum of £400,000 has already been subscribed in England for this purpose. The list of subscribers has been headed by Their Majesties the King and Queen, who have consented to become patrons of the appeal. Her Royal Highness the Duchess of Gloucester has accepted the presidency of the London House Ladies Group, and has subscribed directly to the Australian fund. Committees have been appointed in some of the States of the Commonwealth to assist in the appeal for funds. It is hoped that donations will be received from former students of London House, from educationalists and from citizens interested in the promotion of the aims of higher education and in the strengthening of Empire relations. In New South Wales the committee is under the chairmanship of Sir Charles Blackburn, Chancellor of the University of Sydney, the honorary secretary is Mr. H. McClure-Smith, of *The Sydney Morning Herald*, and the honorary treasurer is Mr. T. B. Heffer, of the Bank of New South Wales. In Victoria the honorary treasurer is Mr. A. R. L. Wiltshire, c.o. G. S. Colman, 114-116, William Street, Melbourne. In South Australia the honorary treasurer is Sir Lloyd Dumas, of *The Advertiser*, Adelaide.

In these days when post-graduate study is being pursued in England with assiduity and when living conditions are enormously difficult, the benefits conferred by London House on Australian and other Empire students need no emphasis. This appeal is bound to succeed.

Current Comment.

HUNGER ŒDEMA.

IT might be an interesting inquiry to attempt to correlate the subjects which attract medical scientists from time to time with great world movements. It is tragic that hunger is of particular interest to the world today, but the history of hunger has been too often the history of revolution and war. After the last world war the topic of hunger œdema aroused much scientific interest, and now we see the wheel turn again, first in some of the prison camps, and later in the countries whose inhabitants should be again knowing freedom. F. A. Denz begins an account of hunger œdema by stating that this condition is endemic in many eastern countries where large populations are existing on the edge of starvation.[1] There is already a fairly extensive bibliography which bears witness to this. The hypotheses which are generally accepted turn to the depletion of plasma protein as the main factor in causation, this deficiency being in turn linked up with a lack of body cellular protein and following on insufficiency of good protein in the diet. Denz in his work confirmed the lowering of the level of the plasma protein in the subjects of hunger œdema, taking a group of German civilian internees for the purposes of investigation, and using healthy British soldiers as controls. Though the degree of œdema corresponded well with the fall in the plasma protein content, considerable variation was noted in the actual figures for both groups. Clinical œdema was sometimes observed when the blood level of protein was not below what is usually taken as the critical level. Denz points out that the first beginnings of œdema are obvious in the lean limbs of the underfed. Further observations were made on the fractionated proteins of the plasma, albumin, globulin and fibrinogen. It is, of course, the albumin which is believed to be most significant, as its smaller molecule is the predominant influence in producing the colloid osmotic pressure of the plasma. Œdema was found to be associated with a lowering of the plasma albumin, but no definite critical level of this constituent could be established, nor could a constant association between the levels of albumin and globulin be proved. Both levels were usually lowered. Estimations of the plasma volume were also carried out. While œdema was present the plasma volume was usually high, falling as the œdema disappeared, accompanied by some hæmoconcentration. The factor of hydræmia is apparently related closely with the œdema, as might be expected, but it is curious that Denz also found that there was a diurnal variation in the plasma protein, which was thought to be associated with changes in the degree of hydration of the blood. It should be noted that the relative ease with which

[1] *The Quarterly Journal of Medicine*, January, 1947.

œdema may be observed in the subjects of undernutrition and malnutrition cannot be relied upon; even in these individuals it was proved that œdema fluid could be hidden in the deeper tissues of the abdomen and the mediastinum. This was clearly demonstrated at autopsy in two instances.

It has been recognized for a long time that a considerable amount of excess fluid may be present in the connective tissues without being clinically obvious. Estimation of the extracellular fluid was also made on a number of occasions; the amount was found to fall as the œdema subsided, and at the same time the excretion of chloride by the kidneys greatly increased. Such observations were facilitated by the finding that œdema due to deficiency of the dietary protein might be reproduced by allowing the patients to take exercise even when they were apparently cured. Observation of this phenomenon made it easily possible to study the changes occurring while the œdema was increasing and while it was disappearing. Thus the occurrence of chloride retention could simply be proved to synchronize with the appearance of œdema with exercise.

The persistence of cellular and possibly other changes after recovery seems to have taken place is no novelty in medical experience. Some of the changes due to malnutrition are irreversible, we know, especially where highly specialized and delicate tissues like the retina are concerned; others appear to be completely recoverable, though perhaps even with some of these time may modify this belief. However, this work, confirming and summing up modern views on hunger œdema, reinforces the old clinical lesson, so important today with crowded hospitals, that recovery may begin when the patient resumes his activities, but it may still be far from complete.

SOME APPROACHES TO RESEARCH WORK.

For many people the idea of research arouses feelings of awe, or something closely akin; it is not for ordinary mortals. The research worker himself (quite unconsciously, no doubt) has helped to create this exclusive and rarefied atmosphere about his world, so that it is rather illuminating to be given some candid views from "backstage". E. C. Dodds, Courtauld Professor of Biochemistry in the University of London, is emphatic that research work is "not for heaven-sent geniuses only". This point of view he has elaborated with apt illustrations from endocrine research in the Addison Lecture[1] delivered at Guy's Hospital in December of last year. The subject is introduced with an account of Thomas Addison himself, "the leading light of Guy's" in the first half of the nineteenth century and an untiring clinical observer, who noted the characteristic features of the disease which bears his name and also the fact that, in the presence of these features, bilateral destruction of the suprarenal glands was found *post mortem*. A succession of workers, among whom Brown-Séquard and Swingle and Pfiffner were notable, followed on, until today cortical hormone is available to keep patients with Addison's disease in reasonable health for long periods. This approach to research, called by Dodds "the Addisonian or Guy's method", is further illustrated by the story of the discovery of thyroxine. Sir William Gull, another Guy's Hospital luminary of slightly later date than Addison, described "a cretinoid state supervening in adult life in women". Ord (1878) termed the condition "myxœdema" and noted its association with a diminished or absent thyreoid gland. Kocher (1889, 1895) commented on the danger of myxœdema supervening on thyreoidectomy. Murray (1891) reported successful treatment of myxœdema with extract of sheep's thyreoid. Kendall (1915) isolated thyroxine, Harrington (1926) proved its chemical constitution, and he and Barger (1927) synthesized it. Sometimes, as Professor Dodds expresses it, "this method hangs fire seriously". For example, diabetes was described accurately by Hippocrates though he did not know that there was sugar in the urine. Thomas Willis, an able and fashionable English physician of the seventeenth century, described the urine as "wonderfully sweet and as it were, imbued with Hony or Sugar". No more progress was made until von Mering and Minkowski, when investigating trypsin in relation to protein digestion in 1889, were astonished to find *diabetes mellitus* developing after experimental pancreatectomy. Laguesse (1893) observed that ligature of the pancreatic duct in the dog was attended by degeneration of the pancreas, but not by *diabetes mellitus*. However, no further advance occurred until Banting and Best in 1922 adopted another method of research, the method in which the scientist considers the data, evolves the solution, and then proceeds to the laboratory to prove his theory correct. Dodds's comment on this is rather amusing:

> This method practically never works. The usual result is that the investigator comes to the wrong conclusion, and the experiments which he devised prove something entirely unsuspected. The case of Frederick Banting, however, is one of the brilliant exceptions to this rule.

The remarkable results of the work of Banting and Best are, of course, too well known to require elaboration here.

An example of the approach in which the research worker sets out to discover a certain thing and discovers something completely different is seen in the work of Szent-Györgyi. He planned "a detailed study of biological oxidation, in the hope that this might lead to an understanding of the function of the interrenal system". In 1928 he isolated from the adrenal cortex, and also from oranges and cabbages, a powerful reducing substance, hexuronic acid. In 1932 he showed that it had the same antiscorbutic activity as the substance found in citrus fruits and was in fact vitamin C or l-ascorbic acid.

The study of the sex hormones illustrates how work done in another field, often academic and apparently unrelated, may solve a major research problem. Following the discovery of Aschheim and Zondek (1927) that large quantities of œstrogenic substances are excreted in the urine of pregnant animals, five such substances were isolated and their chemical structure was determined; an androgenic substance was likewise isolated from male urine. The total synthesis of the series was, however, impracticable. Meantime organic chemists and biochemists had been studying the sterols, and it was found that they had the same basic chemical structure as the œstrogenic and androgenic substances except that the latter lacked an important long side chain. By the removal of the side chain and various chemical manipulations the foundation was laid for the production from cholesterol of several hormones. Today testosterone, progesterone, desoxycorticosterone, œstrone and œstradiol are produced by this technique. Another line of investigation considered the specificity of the molecular structure of the œstrogenic substances for œstrogenic activity and finished with the production of the chemically much simpler but highly active substance stilbœstrol, which, with two related compounds, has proved of much practical value; these substances have the great advantage over the naturally occurring hormones that they are cheaply produced and are effective when administered orally.

Professor Dodds states that the object of his lecture was to encourage young workers to enter research, especially the field of endocrine research. He tried to dispel the current idea of how successful research was conducted; research is never done as it is written. He goes on:

> . . . the cold orderly paper is produced practically always by a series of blundering steps in which the research-worker is rather like someone in a dark room scrambling for the switch and tripping over the furniture. When he has once found the switch and turned on the light, he can arrange the furniture in an orderly manner.

Some may not agree with all of Dodds's approach to his subject, but he is surely right in seeking to encourage those who have keenness and ability but who are diffident of their capacity to enter an "inner circle". The lecture, one feels, achieved its purpose and, at the least, has provided us with a delightful essay.

[1] *The Lancet*, May 24, 1947.

Abstracts from Medical Literature.

THERAPEUTICS.

The Action of Heated Cod Liver Oil upon Tubercle Bacilli.

J. SOLOMIDÈS (*Revue de la tuberculose*, 1946) describes a method of treating cod liver oil so that its lethal effect upon suspensions of tubercle bacilli is greatly enhanced. Ten to fifteen millilitres of cod liver oil are placed in an inch-wide test tube and the mouth lightly plugged with cotton; the tube is then heated for fifteen minutes sufficiently for the oil to give off a thick smoke. The heating should not be so violent that the smoke comes out through the cotton; it should fall back into the oil when the heating is complete. The best results are obtained when the oil is heated for fifteen minutes to a temperature of 180° C.

Penicillin in the Treatment of Subacute Bacterial Endocarditis.

H. E. RYKERT (*The Canadian Medical Association Journal*, December, 1946) discusses the present status of penicillin in the treatment of subacute bacterial endocarditis and publishes the results of such treatment in fifteen cases. He states that it is now generally agreed that treatment of subacute bacterial endocarditis with penicillin results in arrest of the infection in a large percentage of cases, but that many problems of treatment still remain, such as dosage of the drug, duration of treatment, and the method of administration. In the fifteen cases studied clinical arrest was achieved in five, probable clinical arrest with death due to sequelæ of the primary disease occurred in five, and treatment failure resulted in the remaining five. In the majority of cases a daily dosage of 200,000 units of penicillin for a period of 28 days is considered an adequate course of treatment. If the clinical response to treatment in the first week is unsatisfactory, a prompt increase in dosage to 500,000 units daily is considered advisable. If the disease has been of more than average duration before institution of treatment, it may be advisable to prolong the course of treatment. Both the continuous intramuscular drip and intramuscular injections at intervals of three hours were found to be satisfactory methods of administration of the drug. Upon the basis of results obtained in his series of cases, the author is of the opinion that clinical arrest, if not permanent cure of the disease, may be anticipated in at least 50% of cases.

Thiouracil Therapy of Toxic Thyreoid Disease.

E. M. WATSON (*Edinburgh Medical Journal*, November, 1946) discusses the treatment of toxic thyreoid disease with thiouracil, and states that a favourable response can be expected in approximately 80% of cases. Thiouracil may be used to advantage in the following circumstances: (*a*) in the treatment of hyperthyreoid patients with diffuse goitres in the hope of initiating a prolonged and ultimately permanent remission of the disease, (*b*) in the treatment of patients with mild or recurrent hyperthyreoidism, (*c*) in the treatment of patients with conditions unfavourable for surgical operation, (*d*) preparatory to thyreoidectomy with a view to minimizing the element of operative risk. Unpredictable toxic effects such as agranulocytosis, although relatively uncommon, should be anticipated, recognized early and dealt with promptly. The expectation of newer, more potent and safer antithyreoid chemical compounds for clinical use can be entertained. The author is of opinion that all statements about the therapeutic efficiency of thiouracil must be regarded as tentative, pending results of more accumulated experience with this type of drug.

Folic Acid.

F. H. BETHELL *et alii* (*The Journal of Laboratory and Clinical Medicine*, January, 1947) have given folic acid (pteroyl-glutamic acid) and its hexaglutamyl conjugate orally to sixteen patients. The series included nine patients with pernicious anæmia in relapse, two with macrocytic anæmia following gastrectomy, one with chronic liver disease associated with macrocytic anæmia, one with macrocytic anæmia believed to be due to nutritional deficiency and three with pernicious anæmia in a state of remission due to administration of liver extract. The hæmatopoietic responses were observed and the urinary excretion of folic acid was measured during the administration of the conjugated and free vitamin. Three patients with pernicious anæmia in relapse and one patient with macrocytic anæmia following gastrectomy exhibited little or no evidence of erythrocyte regeneration when given the conjugate in a yeast concentrate containing strong conjugase-inhibiting activity. Significant responses occurred when these patients received either equivalent doses of synthetic folic acid or the yeast concentrate after incubation with an enzyme preparation which liberated the free vitamin from its conjugated form. Two patients with pernicious anæmia in relapse had definite hæmatopoietic responses when they were given the equivalent of five milligrammes daily of folic acid as the conjugate in a yeast concentrate containing relatively little enzyme inhibitor. The patient with probable nutritional macrocytic anæmia showed a suboptimal response to the administration of the yeast concentrate with strong conjugase-inhibiting activity. Determinations made prior to the institution of therapy revealed that the urinary excretion of folic acid was lower in patients with macrocytic anæmia than in normal subjects or patients with pernicious anæmia in a state of remission due to liver extract. In patients with pernicious anæmia, macrocytic anæmia following gastrectomy and liver disease, the urinary excretion of free vitamin after the oral administration of conjugate with large amounts of inhibitor was much less than the level obtained in normal subjects. It is concluded that patients with pernicious anæmia in relapse and macrocytic anæmia after gastrectomy cannot readily utilize for hæmatopoiesis a naturally occurring conjugate of folic acid, although they respond promptly to the administration of the free vitamin. This defect is not absolute and varies in different patients. Inability to utilize the conjugated vitamin appears to depend, at least in part, upon a conjugase-inhibiting substance present in natural sources of the conjugate. Determination of the urinary excretion of pteroyl-glutamic acid after conjugate administration provides an index of the ability to liberate the free vitamin from its conjugated form. One of the pharmacological actions of the liver principle may be the correction of the metabolic defect in the utilization of naturally occurring conjugated forms of pteroyl-glutamic acid.

C. F. VILTER *et alii* (*The Journal of Laboratory and Clinical Medicine*, March, 1947) have reported an investigation in which synthetic folic acid in doses of 10 to 15 milligrammes a day or 30 milligrammes three times a week given orally maintained 21 persons suffering from pernicious anæmia in a state of apparent remission (by hæmatological standards) for one year. Three patients with pernicious anæmia in whom treatment was begun during a relapse responded satisfactorily to an initial daily dose of ten milligrammes of folic acid, but two of them required increasing amounts daily to maintain the remission; the third patient received fifty milligrammes a day for most of the year to determine the effect of the substance on peripheral neuritis. Folic acid given orally controlled the manifestations of sprue in two persons for one year, nutritional macrocytic anæmia in one person for seven months, and macrocytic anæmia secondary to ileosigmoidostomy in one person at least as effectively as liver extract. Folic acid in doses of 10 to 50 milligrammes a day did not prevent the development of combined system disease in four persons with pernicious anæmia. After combined system disease developed, folic acid in doses of 100 to 500 milligrammes a day given orally did not stop its progression in these persons. Liver extract, however, promoted rapid improvement. These observations suggest that an unknown factor or factors in liver other than folic acid are essential for maintaining the integrity of the central and peripheral nervous systems in persons with pernicious anæmia. Folic acid cannot be considered satisfactory or complete treatment for pernicious anæmia and should not replace potent liver extract in the routine treatment until another method for the protection of the nervous system is devised.

NEUROLOGY AND PSYCHIATRY.

Current Army Psychiatric Problems.

JOHN W. BICK, JUNIOR (*The Journal of Nervous and Mental Disease*, January, 1947), in discussing current army psychiatric problems, states that since "V.J. Day" there has been a change in the clinical picture shown by the soldier seeking psychiatric attention. Whereas previously anxiety reactions were predominant, there was in 1946 negligible anxiety, but a considerable number of patients showed dissatisfaction and resentment often with an insufficient degree of symptomatology to justify a psychiatric diagnosis. In the author's opinion severe anxiety reactions in soldiers are frequently brought about by the conscious and unconscious dread of impending combat. The present cases are largely due to the inadequate evaluation of soldiers prior to enlist-

ment. It is useless for a community to attempt to solve the problem of its alcoholics and social misfits by induction into the army. Every prospective soldier should be made to obtain a clearance from the social agencies prior to enlistment.

Depersonalization Syndrome.

G. TAYLEUR STOCKINGS (*The Journal of Mental Science*, January, 1947) draws attention to five cardinal symptoms of the depersonalization syndrome and adds a sixth, the high degree of responsiveness to the electroshock therapy. The symptoms are: (i) unreality and depersonalization feelings; (ii) affective disturbance, being a quiet depressed apathetic state; (iii) cephalic paræsthesia; a "numbness" or "emptiness in the head"; (iv) thought disorder; slowness and difficulty in thinking, subjective rather than objective. Projection features as hallucinosis and delusions are absent. If untreated, this syndrome may last several months to a year or so; the prognosis is ultimately good.

Cerebral Circulation.

F. A. GIBBS, H. MAXWELL AND E. L. GIBBS (*Archives of Neurology and Psychiatry*, February, 1947) estimate the volume flow of blood through the brain by injecting an inert dye, Evans blue, into the internal carotid artery and, after two minutes, estimating the concentration of the dye in the jugular bulb. With this method the average resting flow in seven patients was 617 millilitres per minute. By hyperventilation it is possible to reduce the blood flow by one-half and by breathing 10% carbon dioxide to double the cerebral blood flow.

Ambulatory Electroconvulsive Therapy.

FRED FELDMAN, EVELYN GOMBERT AND S. EUGENE BARRERA (*The Journal of Nervous and Mental Disease*, February, 1947) discuss procedures at the Albany Hospital which utilize electroshock therapy at the rate of 5500 treatments annually, more than 3000 of which are given to ambulatory patients. It is considered important that patients shall be first treated as in-patients in order to obtain a thorough understanding of their reactions. The treatment is carried out under hospital conditions with expert nursing assistance.

Insulin Therapy in Schizophrenia.

R. K. FREUDENBERG (*The Journal of Mental Science*, January, 1947) reviews the results of insulin therapy in schizophrenia and includes a close study of 112 cases. He believes that deep coma treatment combined with resocialization activities is important. When the duration of illness was less than one year 80% of his patients were able to leave hospital and 53·6% when the duration was from one to three years. The type of subject responding best to insulin is the same as the one having a good prognosis without treatment, namely, the subject showing acute onset following on gradual onset with a depressive setting, and a duration of less than one year, or longer if symptom-free periods occur. Patients with inappropriateness of affect do better than those with apathy; those with motor restlessness do better than the stuporous type. Patients with florid and changing delusions have a better prognosis than those with well-defined delusions; and a prepsychotic personality with manifold interest and a good contact with reality is a favourable factor.

Intensive Electric Shock Treatment in Acute Mania.

F. T. THORPE (*The Journal of Mental Science*, January, 1947) divides the course of electric shock treatment into three phases: the first, lasting two to four days, during which the mental excitement is suppressed by one to six electric shock treatments daily; the second phase, lasting four to eight weeks, when maintenance of control will depend on the spacing of treatment, perhaps twice weekly; finally convalescence and rehabilitation with cessation of electric shock treatment. In the author's experience, with the usual care, the intensive treatment is without danger or undesirable sequelæ.

Group Therapy.

BENJAMIN SIMON, JULES D. HOLZBERG, SOLOMON AARON AND CARL H. SAXE (*The Journal of Nervous and Mental Disease*, February, 1947) discuss group therapy from the viewpoint of the patient. The authors describe group therapy procedure in the Mason General Hospital, which at its peak had 3200 patients. Weekly sessions are conducted by the psychiatric social worker and the ward medical officers. A *questionnaire* to patients revealed that the majority of patients were helped on their way to recovery by group therapy. In the words of one patient, "we get to understand the other fellow and his difficulties as he becomes acquainted with you. We discover how relative our problems are and confide and advise one another way after the 'Group Therapy' hour has ended".

Gastric Neurosis.

JAMES A. HALSTEAD (*The Journal of Nervous and Mental Disease*, February, 1947) discusses the management of "soldier's stomach" among combat infantrymen. In the Mediterranean theatre cases of epigastric distress constituted a major medical problem analogous to that of effort syndrome in World War I; 500 cases of gastric neurosis and 250 of peptic ulcer occurred in 13,000 admissions. In a review of 100 patients with ulcer and the same number of chronic non-ulcer dyspeptics, it was found that of the latter 80% were rendered ineffective by neurotic symptoms in addition to the dyspepsia, whereas only 6% of the ulcer patients had disability from psychoneurosis. At first the results of treatment were uniformly bad, the majority of the patients returning to hospital within a few weeks. Experience showed that this was due to a tactical mistake. After data had been obtained whereby it was possible to differentiate with accuracy ulcer from non-ulcer patients, the latter were sent to a gastro-intestinal centre of 250 beds for treatment on specialized psychiatric lines. The average patient returned to duty in seven days. No effort was made to develop real insight into the emotional origin of symptoms, as from experience it was considered that such procedures were dangerous. Instead, the patient was treated as a man with a mild illness which, though handicapping, was not disabling. It was explained that few soldiers felt entirely well in combat, and that it was expected that the patient also could carry on in spite of discomfort just as many others did. He was told that he had no organic disease, that his distress was caused by nervousness, and that physical activity would not harm him. The author discovered that it was very important never to tell the patient to "go back and try it", as this would make the patient feel that the physician doubted his ability.

Teeth as a Source of Headache.

S. ROBERTSON, H. GOODELL AND H. G. WOLFF (*Archives of Neurology and Psychiatry*, March, 1947) induced pain in teeth affected with small "pit" caries or with small chips in the enamel, using electrical methods. When the stimulus was first applied a burning aching pain was felt in the tooth. As the duration of the stimulus was increased the local pain increased and it was accompanied by general symptoms of apprehension, flushing of the face, profuse salivation and lachrymation. When the stimulus was ceased, the local pain was replaced by a feeling of pressure in and around the tooth, "as if something was lodged there". In addition a sense of fullness and later a steady ache developed over the same and adjacent segments of the fifth cranial nerve (in the case of teeth of the upper jaw over the first and second segments and in the case of teeth of the lower jaw over the second and third segments). This headache persisted for from one to eight hours. These symptoms were abolished by infiltration of a local anæsthetic agent about the focus—that is, the affected tooth. The authors conclude that noxious impulses arising from the teeth and associated with headache, although clinically important, are not a common cause of headache; headache due to a diseased tooth without toothache is rare. They suggest that any facial neuralgia is not due to teeth, even though seriously diseased, unless it is dramatically reduced or eliminated by local anæsthesia of the suspected focus. Migraine, atypical neuralgia and major trigeminal neuralgia never stem from dental disease.

Tinnitus and Vertigo.

DANIEL E. SCHNEIDER (*The Journal of Nervous and Mental Disease*, February and March, 1947) discusses the growth concept of nervous integration and suggests that tinnitus and perhaps vertigo may be related to neuritic disease, either by reflex stimulation or by direct involvement of the geniculate ganglion and the tympanic plexus. He pleads for otological surgical research in stripping the tympanic plexus to reduce internal physiological noise and restore the preeminence of external sound conduction. Five cases are quoted in which treatment of dental conditions relieved the tinnitus. The forms of treatment included extraction of a bicuspid, adjustment of the bite of prognathism and the insertion of dental fillings, relief of pulpitis, and attention to tooth impaction and to a retained root fragment. The author considers that the hearing apparatus of man is a sonic wave system subject to wave interference and summation. He discusses the relationship of otosclerosis and Ménière's syndrome to the tympanic plexus and the complicated cephalic ganglion system. Finally the author states that there are only four fundamental senses. Taste is merely a synthesized sense composed of a tactile and a trophic element which sensitizes the papillæ of the tongue.

British Medical Association News.

ANNUAL MEETING.

THE annual general meeting of the Australian Society of Anæsthetists (British Medical Association) was held on April 15, 1947, at Adelaide, DR. H. J. DALY, the President, in the chair.

MINUTES.

The minutes of the annual general meeting held in January, 1946, at Sydney, were read and confirmed.

ELECTION OF PRESIDENT.

On the motion of Dr. J. F. McCulloch, seconded by Dr. Gilbert Brown, Dr. R. H. Orton was unanimously elected President for 1947.

RETIRING PRESIDENT'S ADDRESS.

Dr. H. J. Daly, the retiring President, then delivered an address (see page 253).

ELECTION OF OFFICE BEARERS.

The newly elected President, Dr. R. H. Orton, then took the chair. The following office bearers were elected unanimously: *Vice-President*, Dr. E. Beech (on the motion of Dr. Geoffrey Kaye, seconded by Dr. A. D. Lamphee); *Secretary*, Dr. J. Watson (on the motion of Dr. E. Beech, seconded by Dr. A. Robertson); *Treasurer*, Dr. T. P. Crankshaw (on the motion of Dr. Gilbert Troup, seconded by Dr. Mary Burnell).

LIBRARY AND MUSEUM.

The President referred to the splendid work done by Dr. Geoffrey Kaye as librarian and curator of the museum without official standing, and mentioned the action taken by the Executive Committee, in which Dr. J. F. McCulloch had moved and he himself had seconded a motion to amend the constitution and create the position of librarian and curator. This motion would have to be sent as a referendum to each member.

It was moved by Dr. Gilbert Brown and seconded by Dr. J. F. McCulloch that the sum of £100 be allotted from society funds to Dr. Geoffrey Kaye to cover the cost of the burglar-proof door of the museum, and of the binding of journals and of books for the current year. The President asked for a vote of thanks to Dr. Kaye. This was moved by Dr. Gilbert Troup, seconded by Dr. Bridges Webb and carried with acclamation.

EDUCATIONAL SUBCOMMITTEE.

The President referred to the possibility of collaboration with the Royal Australasian College of Surgeons. Dr. H. J. Daly suggested that the formation of a conjoint board by the Royal Australasian Colleges of Physicians and Surgeons, which would grant diplomas like the diploma in anæsthesia, was greatly to be desired. Dr. Geoffrey Kaye moved and Dr. A. Robertson seconded the following motion:

> We, the Australian Society of Anæsthetists (British Medical Association), in general meeting at Adelaide, on April 15, 1947, hereby petition the Royal Australasian College of Physicians and the Royal Australasian College of Surgeons to set up a Conjoint Board for the purpose of establishing a Federal Diploma of Anæsthesia in place of the State Diplomas at present awarded by the Universities of Sydney and Melbourne. Further, we suggest that any such Federal Diploma should be affiliated, as far as is practicable, with the Diploma of Anæsthesia of the Royal Colleges of Physicians and Surgeons of England.

The motion was put to the meeting and carried.

FINANCE.

A financial statement showing a credit balance of £141 was circulated. On the motion of Dr. J. F. McCulloch, seconded by Dr. Gilbert Troup, the financial statement was adopted.

SYMPOSIUM ON SPINAL ANALGESIA.

A symposium on spinal analgesia was held, to which the following contributed: Dr. J. F. Barker and Dr. Gilbert Brown (South Australia), Dr. T. P. Crankshaw and Dr. Geoffrey Keye (Victoria), Dr. L. G. B. Cumpston (Western Australia), Dr. J. F. McCulloch (New South Wales). The following is a summary of the material presented.

The programme called for a series of reports from various Australian hospitals upon the use of spinal analgesia in the period from 1937 to 1946. It was hoped that a sufficiently large series of cases might be amassed to provide an authoritative picture of the mortality and morbidity associated with this form of analgesia. Unfortunately the material actually presented came from somewhat divergent sources—namely, (*a*) metropolitan public hospitals, (*b*) service hospitals, and (*c*) the experience of individual anæsthetists. So different were the types of patients handled and the manner of presentation of the results that collation was not practicable. The best that could be done was to present the salient features in the following way.

Civilian Public Hospitals.

Comparable figures were obtained from only two of the large public hospitals. The total number of spinal analgesic administrations was 5,561; this number represents 47·5 per 1,000 of the 117,348 operations (other than dental) performed in those hospitals during the decade 1937-1946. The analgesic agents used were procaine in 5% or 8% solution, "Nupercaine" in 1 in 200 or 1 in 1,500 solution, and the 10% solution of "Metycaine".

Immediate Mortality.

The mortality upon the operating table or immediately after the return of the patient to the ward was 2·7 per 1,000 (15 deaths in 5,561 cases). This figure seemed to be high in comparison with that yielded by inhalational anæsthesia. The latter method, in one of the hospitals in question, showed an immediate mortality of 0·5 per 1,000 in the case of ether and 1·6 per 1,000 in that of the gaseous anæsthetics, which were used for the worst operative "risks". However, closer analysis disclosed that in only one of the fifteen fatalities under spinal analgesia was the patient a "good risk". The remaining fourteen patients all presented serious pathological lesions and required major surgical intervention. In eight instances the pathological condition was one of intestinal obstruction, mesenteric thrombosis or paralytic ileus. This fact gives emphasis to the view, widely expressed in the current literature, that the choice of spinal analgesia is unwise in such cases.

Delayed Mortality.

Of 4,215 patients who survived the immediate hazards of operation, 21 (or 5·0 per 1,000) died in the ensuing twenty-four hours. It is not known whether this mortality rate is high or not, for no comparable series of cases handled under inhalational anæsthesia was available. There did not seem to be any advantage in investigating those deaths which took place later than twenty-four hours after operation. Of the 21 patients who succumbed, three died frankly from hæmorrhage and one from coronary arterial occlusion. Of the remaining seventeen, one died after prostatectomy and sixteen after abdominal section. In only a single case in the latter group was there any reason to attribute the fatal outcome to the use of spinal anal[illegible].

Morbidity.

Figures for morbidity were obtainable from only one hospital. They were secured by analysis of 2,155 individual case histories, and the results can be more usefully expressed in percentages, rather than per thousand, as in the case of the fatalities.

Headache.—Post-analgesic headache was reported in 7·1% of the series (in 153 out of 2,155 cases). Its incidence in upper abdominal and thoracic analgesia was 6·0%, as against 7·3% in lower abdominal or crural analgesia and 9·5% in perineal analgesia. These figures suggest a higher incidence in block of the lumbo-sacral nerve roots, a procedure usually effected by means of a small volume of concentrated hyperbaric solution. Support for this view was provided by the fact that the incidence of headache after 1,071 administrations of the 1 in 1,500 solution of "Nupercaine" was 5·9%, whereas after 1,084 administrations of various hyperbaric solutions its incidence was 8·3%. In a small series of 132 cases, in which the 10% solution of "Metycaine" was used for lumbar or sacral block, the incidence of headache was 13·6%.

Respiratory Infection.—Respiratory infection developing within seven days of operation was observed in 7·4% of the series (in 159 cases out of 2,155). This figure seemed to be unduly high in comparison with inhalational anæsthesia, which shows an incidence of perhaps 0·6% in private civilian practice and 2·6% in the army. Spinal analgesia for perineal operations had a case incidence of 3·5%, whilst that for operations upon the limbs or lower part of the abdomen had one of 6·4%. Analgesia for operations upon the upper part of the abdomen or thorax had a case

incidence of 9·8%. The case incidence, then, appeared to be related to the cranial extension of analgesia. This fact is probably due to the reduced pulmonary ventilation which occurs in block of the thoracic spinal segments. It is an argument for the initiation of post-operative "stir-up" treatment at the earliest practicable opportunity, especially after "high" spinal analgesia.

Neurological Sequelæ.—No case of meningitis or of major nervous paralysis was recorded in the series. Transient diplopia occurred in three patients out of 2,155—that is, in 0·14%. Retention of urine was noted in 1·7% of patients, but this figure is probably without significance, since retention may follow many operations irrespective of the type of analgesia or anæsthesia employed.

The Services.

Reports from the armed forces were received as follows: Royal Australian Navy, 814 administrations; Australian Army, 1,158 administrations; Royal Australian Air Force, 710 administrations. The total was therefore 2,682 administrations. No fatality was recorded. No significant figures were given for morbidity. It should be appreciated that service patients are usually young and physically fit; they are therefore not comparable with patients in civilian hospitals. Spinal analgesia was seldom, if ever, used in the services for patients suffering from recent injuries of battle.

Experiences of Individual Anæsthetists.

Reports were received from several anæsthetists describing their experience with spinal analgesia in either civilian or military practice. These reports differed so greatly in subject, presentation and outlook that their collation is impossible. Some of the more comparable figures are given below (Table I).

Summary and Conclusions.

It is unjustifiable to draw rigid inferences from so small a series of cases as the present. The results, however, are not without suggestive value and may be summarized as follows:

1. The mortality rate for "good-risk" patients was low in the series, especially in the services.

2. The mortality rate for "poor-risk" patients seemed to be high, and the choice of spinal analgesia for them was of questionable wisdom. This statement applies especially to patients who are old, debilitated or suffering from intestinal obstruction.

3. The incidence of post-analgesic headache was of the order of 7%, and appeared to be higher after sacral block than after thoracic block. This fact is possibly related to the common use of concentrated solutions for the production of sacral block.

4. The incidence of respiratory sequelæ was of the order of 7%, and seemed to be higher after block of the upper thoracic segments than after that of the lower thoracic or lumbo-sacral segments. This fact is possibly related to the diminished pulmonary ventilation which accompanies "high" thoracic block and to the post-operative immobility enforced for some hours after spinal analgesia.

5. Minor and transient neurological sequelæ were occasionally met. Meningitis or permanent nervous paralysis was very rare.

6. The need still exists for the collection of detailed records of large series of cases. Without this information, it is still impossible to assess the present status of spinal analgesia.

Discussion.

DR. R. H. ORTON, in opening the discussion, pointed out that the cases studied fell into two groups, civilian surgery and military surgery, and that these groups were not comparable. Further, the study of such a small series was almost useless statistically. Another factor to be considered was the presence or absence of respiratory infection before operation. When such infection was absent, the use of any anæsthetic agent gave a standard rate of post-operative respiratory infection. The presence of respiratory infection before operation resulted in a tenfold increase of post-operative infection.

DR. H. J. DALY, commenting on the present use of spinal analgesia in Sydney, said that heavy "Nupercaine" solution introduced by Silverton was the main agent used. Light "Nupercaine" solution was but little used, and procaine seldom. He noted that all six deaths in Dr. Gilbert Brown's series were in cases in which light "Nupercaine" solution was used. The rule for spinal analgesia was to reserve it for people who could stand it. He thought that the incidence of post-operative respiratory infection in Dr. J. F. McCulloch's cases might well have been due to preexisting infection. Headache following spinal analgesia might be due to leakage of cerebro-spinal fluid into the epidural space, where a negative pressure was normally found.

DR. A. D. LAMPHEE said that the argument was that of enthusiasts *versus* conservatives. In evaluation of the statistics, the significant fact emerged that there were two important classes of patients—the healthy young patients, among whom low mortality and morbidity figures were found, and the old patients, often with cardio-vascular lesions. For the latter, especially in intestinal obstruction, spinal analgesia should not be used, as Dr. Brown's figures had shown. Dr. Lamphee used heavy "Nupercaine" solution for old people, not light "Nupercaine" or procaine solution. He had used "Novocain D" solution, and had found severe falls of blood pressure and later reactionary hæmorrhage. He had been impressed with the value of "Neo-Synephrine Hydrochloride" in the maintenance of blood pressure levels, which had to be brought almost to normal before the "sewing-up" to avoid the occurrence of reactionary hæmorrhage.

DR. GEOFFREY KAYE remarked that in Dr. T. P. Crankshaw's series the amount of respiratory infection after operation depended on the cranial level of the analgesia. The incidence after pure sacral block was 3·5%, after lower abdominal block 6%, and after upper abdominal block 10%. This correlation with the height of the anæsthesia was to be expected from the degree of intercostal block. Post-operative quiescence favoured atelectasis, which was countered by an adequate "stir-up". In summary, there was little anxiety after sacral block. There was little depression or respiratory infection after lumbar or lower thoracic blocks. "Neo-Synephrine" was valuable for depression, and oxygen for stagnant anoxia. An upper abdominal operation should not be performed under spinal analgesia without good reason. Dr. Kaye doubted whether there was any difference between the sequelæ of the use of light and heavy solutions. It was to be emphasized that thoracic block was obtained at the price of circulatory depression, lessened lung ventilation and post-operative respiratory infection.

The Nosworthy Record System.

DR. GEOFFREY KAYE (Victoria) read a paper on the Nosworthy record system.

Controlled Respiration.

DR. R. H. ORTON (Victoria) read a paper entitled "Controlled Respiration" (see page 255).

DR. S. R. HESKER, in opening the discussion, praised Dr. Orton's skill in this field of anæsthesia. He referred to the dangers and difficulties encountered when such skill was not exercised, and deplored the paucity of references to the method in the literature.

DR. H. J. DALY referred to the appreciation of Dr. Orton's skill shown by a Sydney thoracic surgeon who had recently visited Melbourne. Dr. Daly asked how much "Pentothal" was used and how quickly it was given. He referred to

TABLE I.

Anæsthetist.	Type of Practice.	Number of Cases.	Agents Employed.	Mortality (24 Hours); Number of Deaths.	Morbidity.
A	Army.	1,884	"Nupercaine" (0·5%) "Nupercaine" (one in 1,500).	Nil	As for Anæsthetist B.
B	Army.	164	"Nupercaine" (0·5%)	Nil	Cases of atelectasis, headache, backache and urinary retention.
C	Civilian.	536	All those in common use.	3	Cases of paralysis of legs, atelectasis, headache, pleurisy, bronchitis, hiccup.

the heat developed in a Waters canister and to the appearance of soda-lime dust on the patient's lips and nose. He himself had had three deaths after pneumonectomy since 1935. One patient died of cerebral secondary deposits four months later, another of massive hæmorrhage from the tourniquet site two days later, and the last of purulent pericarditis after five days.

DR. J. F. MCCULLOCH said that control could be maintained even with light anæsthesia, but the type of machine used was important. One vexed question was whether or not the patient should be subjected to bronchoscopy at the end of operation. Some surgeons considered this to be necessary; but the procedure necessitated extra duration and depth of anæsthesia, as well as a good deal of movement of the patient. It seemed that Dr. Orton's technique obviated the need for bronchoscopy on the table.

DR. GILBERT TROUP stressed the importance of the role of carbon dioxide accumulation in the incidence of post-operative shock. This was especially seen after the use of respiratory depressants such as cyclopropane and "Pentothal Sodium", unless controlled respiration was practised. He asked Dr. Orton for comments on Overholt's use of local anæsthesia, and on the necessity for inducing artificial pneumothorax prior to pneumonectomy.

Dr. Orton, in reply, said that in induction of anæsthesia he seldom used more than 0·5 gramme of "Pentothal Sodium", except for an occasional large male adult patient. Bronchiectasis or lung carcinoma did not usually occur in this class of patient. The "Pentothal" solution was given fairly quickly through the intravenous drip apparatus after a small test dose. The usual total was 8·0 to 12·0 millilitres of a 5% solution. Dr. Orton said that he disliked the heating found with the Waters canister, but had seen no ill-effect from it. For small children he used an uncuffed catheter, sealed by a face mask, connected to a small canister, and often found soda-lime dust on the face or even on the cornea. There were no obvious sequelæ. He thought that the causticity of the dust was rapidly mitigated by absorption of carbon dioxide, especially in the respiratory tract. In reply to Dr. McCulloch, Dr. Orton said that he performed bronchoscopy on the operating table only when there was some real indication. Instead, he performed aspiration through the Magill tube with the patient lying on his "bad" side in a Trendelenburg position. He had performed bronchoscopy on many patients, but found little advantage, as the terminal bronchi were out of reach of the bronchoscope, and the incidence of atelectasis was not altered. Subsequent bronchoscopy depended on the severity of the atelectatic signs. Gross deviation of the trachea or a temperature over 100° F. with penicillin treatment indicated bronchoscopy. Lesser degrees of atelectasis were treated by tracheo-bronchial toilet or by expectant measures. The use of pre-operative penicillin nebulization had obviated pre-operative bronchoscopy. In cases in which secretions were present, the exposed lung should be frequently inflated during operation, else atelectasis would occur. However, if the lung was "clean", as in operations for patent *ductus arteriosus*, it could be packed flat for hours and subsequently inflated without difficulty. For pneumonectomy, Dr. Orton said that he used endobronchial intubation with Magill's instrument. If one-lung anæsthesia was maintained with the opposite lung expanded, cyanosis would occur. The exposed lung must be allowed to collapse to obviate the shunting effect. He did not consider that an artificial pneumothorax should be established before pneumonectomy. Operable patients seemed to suffer no harm from the omission of this procedure. In reply to Dr. Troup, Dr. Orton said that Overholt's use of local anæsthesia was based on false premises. It appeared that Overholt often had to resort to nitrous oxide and sometimes ether as well as very heavy premedication.

A New Endotracheal Adapter.

DR. W. A. PRYOR, at the end of the discussion, demonstrated a new endotracheal connector and a modification of Cobb's T-piece. He described his aims in the modifications, and spoke of the difficulty of measurement of resistance to breathing. His appliances were designed to provide the minimum resistance.

DR. GILBERT BROWN thanked Dr. Pryor for his original ideas, and stressed the need for active investigation.

DR. R. H. ORTON pointed out that when gas flow through a tube was laminar, the rate of flow was proportional to the fourth power of the diameter.

DR. GEOFFREY KAYE advocated the maintenance of a bore of at least seven-eighths of an inch whenever possible, to lower resistance; but dead space was still of great importance. He advocated the extension of Dr. Pryor's researches to include the measurement of the resistance of breathing valves, and spoke of the difficulties of doing this. In this case the factors of gas flow, of rate of lift, and of lift resistance had to be considered. He hoped that an investigation on these lines might be made with the help of university experts.

CURARE.

DR. GILBERT TROUP (Western Australia) read a paper entitled "A Review of Curare as an Adjuvant to General Anæsthesia" (see page 259).

DR. R. H. ORTON congratulated Dr. Troup on a valuable paper and on excellent methods of investigation in an appreciable series of cases.

DR. H. J. DALY also commended the presentation and referred to his own experiences. He mentioned that as early as 1935 Magill had predicted the use of curare for obtaining relaxation. Dr. Daly thought that curare was indicated when great relaxation was needed, as in operations on the upper part of the abdomen, or for the sick patient. Its use was contraindicated in *myasthenia gravis* or when facilities for respiratory control were not available. He doubted that the relaxation obtained was as profound as that with spinal analgesia. Failure to obtain relaxation was usually due to insufficient dosage, sometimes because of deterioration of the drug. This occurred with one preparation whether or not the drug was kept in the refrigerator. The pure solution marketed as "Tubarine" seemed to be the most stable. Dr. Daly referred to a communication in the *British Medical Journal* which stated that the nursing staff found shock and ileus more common after the use of curare. In his opinion this was not true, and he quoted a precise and pungent comment by Dr. S. V. Marshall in support of his belief. Dr. Daly then described a case to illustrate the use of curare in overcoming persistent laryngeal spasm, and emphasized the need for standardization of preparations of the drug.

DR. J. F. MCCULLOCH and DR. GILBERT BROWN described cases of intestinal obstruction in which death had followed operation under cyclopropane and curare. In neither case did the fatal issue seem to be related to the use of curare.

DR. E. BEECH asked whether curare had any effect on the sphincters.

DR. J. E. BARKER asked if Dr. Troup had had experience in the use of "Myanesin".

DR. A. ROBERTSON wanted to know if the loss of the usual signs of anæsthesia caused difficulty in its maintenance, and what signs of anæsthesia were of use with curare.

DR. J. WATSON said that he had used "Prostigmin" as an antidote to curare in one test case, and had found it to be immediately effective without side-effects.

DR. R. H. ORTON, referring to claims of post-anæsthetic shock after the use of curare, said that what was complained of was probably an exaggerated "cyclopropane shock" due to faulty technique. He himself never used curare without full controlled respiration, and found that the nursing staff of the thoracic unit thought their patients were much better after curare. He referred to the literature on the central action of curare, and deplored the fact that there were only the vaguest references to the effect on the vagal reflexes. This to him was of the utmost importance, permitting the use of light anæsthesia for the intubated patient. He mentioned that the drug "Myanesin" was not a curare substitute, as its mode and site of action were not those of curare. It was thought not to depress respiration.

Dr. Troup, in reply, said that he had found "Tubarine" to be the most efficient preparation. It did not deteriorate, and patients seemed to be less restless after operation. He had not seen bronchospasm with its use. He could offer no explanation for the fatalities described by Dr. Brown and Dr. McCulloch. In reply to Dr. Beech, Dr. Troup said that the sphincters were definitely relaxed, as was recorded in various reports in the literature. A small amount of pressure would inflate the stomach if the cuffed catheter was not used. The signs of anæsthesia when curare was used were difficult to assess. Lightening of the anæsthesia was judged by a rising pulse rate and then a rising respiratory rate. Dr. Troup said that he had had success in the use of curare to control an otherwise persistent laryngeal spasm.

Dr. Orton, from the chair, then moved a vote of thanks to Dr. Troup for his illuminating and instructive paper.

ANÆSTHESIA IN THE AUSTRALIAN IMPERIAL FORCE.

DR. J. F. MCCULLOCH (New South Wales) read a paper entitled "Anæsthesia in the Australian Imperial Force" (see page 261).

DR. T. P. CRANKSHAW then related some of his experiences before and after the fall of Singapore. Relative shortage of ether caused him to use at first a chloroform-ether mixture, and later chloroform alone. During the fighting, he supervised an anæsthetic team of one medical officer and several dental officers, who worked in one large operating theatre. Chloroform alone was found to be more manageable than the chloroform-ether mixture, and no death on the operating table was attributable to the anæsthetic. This may have been because priority of operation was given to the less seriously wounded patients, the severely shocked patients being sent to the resuscitation room first. Dr. Crankshaw went on to say that after the surrender he was sent to Changi, and about this time good supplies of intravenous anæsthetic agents became available. As surgery of election became more common, so did the use of spinal analgesia. Sacral and lower abdominal blocks were mostly employed, the agents used being "Stovaine" and "Nupercaine" (1 in 1,500). Late in 1942 the British hospital at Changi had a few cases of meningitis following spinal analgesia, and the method was soon abandoned. Until as late as the middle of 1943 both the British and Australian hospitals were still using nitrous oxide. However, supplies of oxygen and soda-lime dwindled, despite the fact that nocturnal inroads were made on oxygen cylinders belonging to a welding plant of the Royal Engineers.

Dr. Crankshaw then said that in 1943 he was sent to Siam, where he spent some time on the railway. He was allocated to a primitive hospital usually holding about 2,000 patients. Here anæsthesia was needed for the treatment of tropical ulcers, amongst other conditions. It was found that the only way to save the life of a patient with severe tropical ulcer was either to excise the lesion or to amputate the leg. All the patients were in very poor condition, the total death rate being about twenty per day. Anæsthesia under these conditions was a major problem, especially as one 20 millilitre ampoule of chloroform per day was the only agent available. Hypnotism was considered and tried, but was rejected, as patients in urgent need of surgical treatment seemed unable to cooperate. The Dutch psychiatrist who attempted the use of hypnotism eventually proved to be an extraordinarily economical user of chloroform, though his technique was far from conventional. When no more chloroform was to be had, a few five millilitre ampoules of 0·5% procaine solution were issued, and these were used for spinal analgesia. Half an ampoule (12·5 milligrammes of procaine) was generally sufficient to allow the amputation of a leg, though the patient usually complained when the sciatic nerve was cut. It was consoling to know that without amputation most or all of these patients would have died.

DR. R. H. ORTON instanced the risk of applying army standards to civilian practice. The average civilian was by no means as tolerant of drugs as the soldier in good condition. He knew of deaths from overdosage caused in this way.

Dr. McCulloch, in reply, said that he had sometimes found chloroform useful, but had always exercised due care. The utility of nitrous oxide had been very limited, though it could be well combined with "Pentothal" anæsthesia.

THE TEACHING OF ANÆSTHESIA.

DR. JOHN WATSON (Victoria) read a paper entitled "The Teaching of Anæsthesia" (see page 265).

DR. R. H. ORTON congratulated Dr. Watson on his paper, and made reference to the value of well-given "open ether" in obtaining a quiet relaxed abdomen. He thought that extended observations on respiration in anæsthesia might well be incorporated in a monograph.

DR. GILBERT BROWN, in opening the discussion, said that the subject was of vital importance, and standardization was necessary. Good teaching could not be had without a staff under a trained full-time director, who must, of course, be adequately paid. He thought that this situation must eventually come. At present, students in Adelaide had to carry out twenty administrations, and he thought that, of these, at least twelve should be administrations of "open ether". Dental students had to carry out fifty administrations and obtain a pass in a written examination.

DR. H. J. DALY said that in Sydney the teacher had to certify, not to a number of cases, but to the student's proficiency. This was often hard to do conscientiously. In teaching hospitals, the surgeons' demand for advanced methods of anæsthesia curtailed the students' chances of getting the necessary number of cases. Dr. Daly insisted on the use of a card index system. Each student's card was signed by his supervisor in the operating theatre and then returned to the box. Short of an examination, this was the only method that was satisfactory. He adduced as a contrast the instruction in psychiatry, in which the students had twenty lectures and twenty demonstrations. Each student averaged ten anæsthetic administrations. He thought that a director of anæsthesia was needed, so that resident medical officers as well as students could be helped. On the technical side, Dr. Daly thought that an ethyl chloride induction masked the signs of anæsthesia and made the administration of less value for teaching. He regarded the "tracheal tug" sign as produced by the rapid descent of the diaphragm and the lag in filling of the lungs. It was in the nature of a stretch reflex.

DR. GEOFFREY KAYE stressed the importance of the subject. He advocated a reorganization of the teaching system to include only the true fundamentals and physiological basis, and also he considered that modern methods of visual education should be used. The refinements of anæsthesia should be taught only to resident medical officers, and this would necessitate the cooperation of the teaching hospitals.

DR. A. ROBERTSON deplored the paucity of teaching of anæsthesia in Queensland. There were no lectures in the subject, and practical instruction was given by an overworked anæsthetic registrar. He thought that "open ether" should be the basis of student instruction. More advanced teaching would be like giving the students major operations to perform.

DR. GILBERT TROUP said that though a medical school did not yet exist in Perth, it would come. In the meantime there was the problem of teaching resident medical officers. He thought that some scheme on the lines of Dr. Watson's paper should be formulated. The only anæsthetic teaching in Perth was a course of ten lectures to dental students, who had an examination in their final year.

DR. BRIDGES WEBB said that while he was at Heidelberg Military Hospital he used to ask medical officers where they had graduated. If they were from Adelaide, where they had had the teaching of Dr. Brown, he did not have to worry about their anæsthetic skill. The system at the Royal Melbourne Hospital was that each student must have ten signatures on his card, usually from many teachers who had many different ways of giving "open ether". He thought that the student should have suitable preliminary lectures, as suggested by Dr. Kaye, very little theory and much practical teaching, and only one clinical instructor. The resident medical officers should also be suitably instructed.

DR. MARY BURNELL pointed out that the resident medical officers had to give not only "open ether", but intravenous anæsthetics and "spinals", because of the shortage of staff anæsthetists. Moreover, as the new graduates would be certain to use these methods, she thought that they should be taught to the students.

DR. J. F. MCCULLOCH said that he had no teaching post in Sydney, but had had a good deal of experience in instructing army orderlies, who could usually be taught the use of "open ether" and "Pentothal". He insisted that they should be able to distinguish the sounds of obstruction at different sites.

DR. W. A. PRYOR advocated that the resident medical officers of country hospitals should be included in any post-graduate teaching scheme.

After further discussion on the details of a teaching scheme, Dr. R. H. Orton, from the chair, said that, despite individual differences of opinion, the meeting as a whole felt that teaching in anæsthesia must be improved. One difficulty was that sometimes not enough "open ether" anæsthesia patients were available to the students. The surgeons would have to collaborate in making available patients suitable for "open ether".

Dr. Mary Burnell moved, and Dr. H. J. Daly seconded, a motion to the effect that a subcommittee be set up to formulate a scheme to be presented to the universities after it had been circulated to members and approved. The motion was carried.

After discussion the meeting resolved that Dr. Geoffrey Kaye and Dr. J. Watson should act for Victoria, Dr. Gilbert Brown for South Australia, Dr. H. J. Daly for New South Wales and Dr. A. Robertson for Queensland.

PRESENTATION TO DR. H. J. DALY.

As this was the last formal session of the annual meeting, a presentation was made to the President of the previous year, Dr. H. J. Daly, as an expression of appreciation of his services to the society. The presentation was made with general acclamation.

PAYMENT OF ANÆSTHETISTS.

DR. R. H. ORTON, the President, referred to a question which had been raised by Dr. A. Robertson at the executive committee meeting—namely, the payment of anæsthetists. The creation of a position at Newcastle (New South Wales) with a salary of £1,500 *per annum*, rising to £2,000, was mentioned as being the first of its kind in Australia. Dr. Orton quoted his own experience, and said that the Department of Public Health in Victoria paid on a basis of £3 10s. for two hours, £5 5s. for three hours, and £7 for four hours. The Alfred Hospital, Melbourne, where a thoracic unit had recently been established, paid an annual salary of £750, this being based on £5 5s. per session, three sessions weekly, irrespective of holidays.

A general discussion followed. Dr. A. Robertson said that Queensland was not so fortunate. He mentioned the intention of the Brisbane and South Coast Hospitals Board to appoint an anæsthetist at £250 per year, with no definite number of sessions, but an average of two per week. This would place the anæsthetist on the same level as the most junior part-time assistant in other specialties. Further discussion followed, in which Dr. D. R. C. Wilson, Dr. T. P. Crankshaw, Dr. J. F. McCulloch and Dr. Bridges Webb took part, concerning the desirability of establishing a fee suitable as a basis for any discussions in the future in the event of salaried medicine becoming an accomplished fact.

Finally, Dr. Geoffrey Kaye moved and Dr. S. R. Hecker seconded, the following motion:

> The Australian Society of Anæsthetists (British Medical Association) approves the payments of anæsthetists at an annual salary equivalent to £5 5s. per session of not more than three hours.

The motion was carried.

The meeting then closed.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at the Royal Prince Alfred Hospital on May 22, 1947. The meeting took the form of a series of clinical demonstrations by members of the honorary and resident medical staff of the hospital. Part of this report appeared in the issue of August 2, 1947.

Malignant Parotid Tumour.

DR. N. R. WYNDHAM showed a patient to illustrate points in the management of a malignant parotid tumour. These were that such tumours could be excised with preservation of many of the facial nerve fibres, the ones to the *orbicularis oculi* being most liable to damage, and that facial asymmetry could be restored, to a large measure, by minor plastic procedures.

Peripheral Vascular Disease.

DR. F. H. MILLS showed three patients with peripheral vascular disease. The first two showed the value of packing gangrenous limbs in ice without tourniquet as a preoperative measure. By this means diabetic pre-coma was controlled in one patient and severe infection in the other. Also in both patients a satisfactory below-knee amputation was performed, because trial incision showed adequate blood supply.

The third patient was suffering from scleroderma. The nail had been removed from the left great toe six months before and a slowly progressing gangrene had developed from the site of removal.

Tuberculous Salpingitis.

DR. G. G. L. STENING presented a female patient, aged thirty-two years, who was married, but had had no children. Prior to seeking medical advice she had suffered from menorrhagia for one year, her menstrual periods lasting fourteen days; they were regular. She had also had dysmenorrhœa for one year, pain coming on before the period and lasting for the first few days of the period. She had had no vaginal discharge, but sacral backache occurred. No urinary trouble was evident and her bowels were regular. An operation had been performed in the country, at which the right tube and ovary had been removed for some inflammatory process, the nature of which was uncertain. She had dyspareunia. Two years before her pelvic trouble the patient had had a skin rash on the neck, the front of the chest and the side of the face, but this did not respond to treatment to any extent. However, it was noticed that, after a fortnight in the sun on holidays, the rash seemed to become alleviated temporarily and the patient thought that there was some connexion between the pelvic trouble and the rash. On examination there was a papulo-necrotic rash on the neck, chest, sides and face. Examination of the abdomen revealed a mid-line scar, but no tenderness, and no palpable mass. On examination *per vaginam* the cervix was healthy, and the uterus was anteverted, regular, impaired in mobility, normal in size, and not tender. There was a tender swelling, which appeared to be two inches in diameter, in the left fornix. At operation on April 4, 1947, dilatation and curettage and left salpingectomy were performed. On opening the abdomen it was seen that there were miliary tubercles present in the pelvis, in the pouch of Douglas, over the back of the uterus, the pelvic colon and the left tube. The latter was enlarged, red and swollen, and the fimbrial end was closed; there were some irregular bosses at the outer end. Diagnosis of tuberculosis was made and the salpingectomy carried out. The abdomen was closed. The pathologist reported the finding in the uterine scrapings of tuberculous endometritis, in which conspicuous numbers of tubercles could be made out, and an occasional tubercular giant cell. Examination of the Fallopian tube revealed tuberculous salpingitis, including involvement of the folds and of the peritoneal surface. In view of the nature of the condition, the patient was questioned regarding her past health and stated that she had felt tired and had been losing weight. There was no contact with pulmonary infection as far as she knew. She had not travelled outside Australia. Her husband gave no history suggesting any tuberculous infection, either pulmonary or genital. No evidence of past or active tuberculous lesions was found in the chest by X-ray examination. The urinary system showed no evidence of tuberculous infection from cystoscopic or bacteriological examination. The patient made an excellent post-operative recovery and it was noticed that the rash had disappeared at the time she left hospital three weeks after operation. The patient felt very much improved generally. Dr. Stening commented that the case was presented as showing a tuberculous infection of the pelvis without any demonstrable primary focus elsewhere. The rash, he suggested, was a tuberculid. Salpingectomy only was performed as it was felt that from the appearance of the uterus at operation it would recover. Subsequently, tuberculous endometritis having been demonstrated, it was felt that further treatment other than general improvement in resistance and health was not indicated; the endometritis was secondary to the tuberculous infection of the tube, and with menstruation the infection in the uterus should clear up.

Symmetrical Cortical Necrosis of the Kidneys.

DR. WILLIAM D. CUNNINGHAM showed pathological specimens of a case of symmetrical cortical necrosis of the kidneys. The patient had been a married woman, aged forty years and a *primipara*. She weighed seventeen stone. On April 12, 1947, she had been admitted to the King George V Hospital as an emergency case. She had complained of headaches, swelling of the legs for four months, blurring of vision for the previous two days and severe abdominal pain for the previous two hours. Her medical attendant stated that her blood pressure had been about 170 millimetres of mercury (systolic) and 110 millimetres (diastolic) since December, 1946, but that she had refused to have the pregnancy terminated. She had been treated for an attack of cholecystitis twelve months prior to admission. On examination the patient showed much obesity and œdema of the ankles and legs. Her blood pressure was 160 millimetres of mercury (systolic) and 115 millimetres (diastolic). The uterus was tender and firm, the size of a thirty-two week pregnancy. No fœtal heart could be heard. A concealed accidental hæmorrhage was diagnosed. Catheterization produced half an ounce of urine only, containing albumin (three eighths present). Labour commenced shortly after admission and a stillborn macerated infant weighing two pounds five ounces was delivered. During labour the patient showed signs of shock, becoming cold, sweating, restless and distressed. The pulse rate was 100 per minute and of poor volume. The blood pressure had fallen to 80 millimetres of mercury (systolic) and 50 millimetres (diastolic). A blood transfusion was commenced, 300 millilitres being given. Her condition improved from then on, and after five hours of labour the pulse rate was 90 per minute and the blood pressure 130 millimetres of mercury (systolic) and 80 millimetres (diastolic). After labour was completed the bladder was catheterized, but no urine was withdrawn. For the next twenty-four hours no urine was passed. A blood count revealed the hæmoglobin content to be 43%. A blood transfusion was given and the usual measures for the treatment of anuria—intravenously given glucose (25%) in distilled water, saline solution aperients, and hot kidney packs—but up to the seventh day only four ounces of urine had been withdrawn every

eight hours by catheterization. During sixteen hours prior to death twelve ounces of urine had been withdrawn and some hope of recovery was held, but death occurred in a state of exhaustion. The blood urea content rose steadily from 99 milligrammes *per centum* on admission to 283 milligrammes *per centum* on the seventh day. The blood pressure too rose steadily to 200 millimetres of mercury (systolic) and 150 millimetres (diastolic). The patient remained conscious and clear-minded till an hour before death.

The specimen showed a uterus which was an excellent example of utero-placental apoplexy with conspicuous hæmorrhages under the pentoneum and throughout the uterine muscle. The kidneys showed no microscopic evidence of necrosis. They were heavier than normal (380 grammes right, 420 grammes left). The capsule stripped readily. Microscopically typical areas of cortical necrosis were present throughout the cortex of the kidneys. The heart and brain were not examined, as permission for a complete post-mortem examination could not be obtained.

Penetrating Head Injury.

DR. GILBERT PHILLIPS presented a male patient, aged eight years, who had suffered a wound in the left frontal region one week previously. He had been struck by a high-velocity 0·22 gauge bullet at short range. X-ray examination showed extensive "spatter" of metal and bone chips in the left frontal lobe. Early *débridement* of the track had been performed a few hours after the wounding and eighteen bare fragments removed. Post-operative X-ray examination showed no retained bone fragments. The wound had healed, the stitches had been removed, and the patient was apparently normal apart from some weakness of the lower part of the right side of the face.

X-Ray Examination of the Cranium.

Dr. Phillips then showed a series of X-ray plates demonstrating special techniques.

The first showed pantopaque visualization of the basal cisterns after the manner described by Arthur Schuller. The contrast medium had filled the *cisterna interpeduncularis* and *chiasmatis* and the stem of the lateral fissure. On the right side the contour of an aneurysm of the internal carotid artery could be seen. The patient had been quite unaffected by the procedure and it was suggested that this method had obvious advantages over arteriography.

X-ray films were then shown of a male patient, aged nineteen years, in which calcification in the contours of an old subdural hæmatoma due to birth trauma could be seen. Air studies revealed dense cerebral scarring beneath the site of the hæmatoma. The whole ventricular system was drawn over towards the calcified area.

The third group of X-ray films was of a male patient, aged thirty-nine years, in which a conical pantopaque "cap" could be seen over the pole of an extramedullary spinal tumour. This patient was awaiting operation.

The fourth group of X-ray films was of a male patient, aged sixty years, in which a chronic subdural hæmatoma had become infected, forming a large intradural empyema. After drainage the cavity had been visualized radiographically after thorotrast injection.

Dr. Phillips's final group of X-ray films illustrated the technique of radiographic control in the placement of a Harris needle point at the *foramen ovale* prior to alcohol injection for the treatment of trigeminal neuralgia.

Bone Cyst of the Humerus.

DR. L. G. TEECE presented two patients. The first was a girl, aged six years, who had had a large solitary bone cyst occupying the proximal end of the right humerus. The first indication of its presence had been given by the occurrence of a pathological fracture in January, 1946. Operation had been performed at another hospital, and the cavity filled with bone chips obtained from the head of the tibia. This, however, had not prevented the occurrence of a second pathological fracture occurring in January, 1947, at which time X-ray examination showed that the size of the cyst was completely unaltered. The bone chips which had been inserted therein had completely disappeared. Operation was accordingly performed at the Royal Prince Alfred Hospital on February 20, 1947. The cyst was exposed by an anterior incision, and a tibial graft, four inches in length, was inserted extending well up into the head of the humerus. An X-ray examination made three months later showed firm union of the fracture; the graft had become well incorporated in the host bone, and the cavity had been almost completely obliterated. Full movements had returned to all joints. Dr. Teece considered that the difficulty in securing a sufficient supply of bone chips from the child's tibia accounted for the failure of the first operation.

Dr. Teece's second patient was a young man, aged twenty-eight years, who, immediately prior to admission to hospital, had, whilst riding a motor cycle, come into collision with a lorry, sustaining an injury which in some respects largely resembled a Monteggia fracture. The head of the radius was dislocated forwards, but in this case the fracture of the ulna was comminuted and situated at a point slightly distal to the middle of the shaft. Dr. Teece explained that it was characteristic of the Monteggia fracture that, provided that accurate reduction of the ulna fracture was secured and maintained, forward dislocation of the head of the radius was automatically reduced and the head showed no tendency to redisplacement. However, in this case, even after open reduction and internal fixation of the fractured ulna, the head of the radius remained in its dislocated position, and it was necessary to make a second incision in order to reduce the head of the radius. Comment was made by Dr. Teece on the fact that in cases in which a fracture of the shaft of the ulna was complicated by a forward dislocation of the head of the radius, the latter lesion readily escaped detection unless careful clinical examination was carried out, and the X-ray picture included a view of the elbow joint.

Acute Osteomyelitis of the Thoracic Vertebræ.

DR. L. J. WOODLAND showed a male patient, aged twenty-eight years, who gave a history that on about July 14, 1946, he had developed a carbuncle between his shoulder blades. The carbuncle was treated without operation and healed after about two weeks. He then went back to work. On the first night after working he complained of pain in the back adjacent to the region where the carbuncle had been. He noticed that the pain was worse on breathing. The pain in the back was continuous and kept him awake. He felt feverish. His medical adviser treated him with sulphadiazine and his temperature subsided. When the tablets were discontinued the temperature again rose. The pain in the back, however, was unrelieved and gradually became worse. X-ray films taken on August 19 showed that the chest was clear, but it was noted that there was slight narrowing of the body of the fourth thoracic vertebra.

The patient was seen in consultation on August 23, when it was noted that he complained of tenderness on pressure over the spinous process of the fourth thoracic vertebra. There was guarding of both upper thoracic sacro-spinal muscles. Axial pressure on the head or on the shoulder caused a complaint of pain over the region of the fourth thoracic vertebra posteriorly.

On August 24 the patient became desperately ill; he was semi-comatose and had signs suggestive of widespread pneumonia in the left lung. He was placed in a plaster bed on a Bradford frame and was given penicillin injections. An X-ray examination made on August 24 showed moderate dulness of the whole of the left lung with pronounced dulness of the base of the left lung. The lateral view showed an opacity about the size of a tennis ball in the superior mediastinum; this opacity completely obscured the fourth thoracic vertebra. The patient's general condition and chest affection quickly improved. X-ray examination on September 10 showed that the left lung dulness had disappeared; the opacity in the superior mediastinum had diminished slightly. On that date the leucocyte count showed 18,000 white cells per cubic millimetre, of which 75% were neutrophile cells. Penicillin injections were continued until September 22, when the patient had received a total of 5,000,000 units.

In subsequent X-ray films it was possible to see the fourth thoracic vertebra in a lateral view, and these films showed marked destruction of the whole of the body of the fourth thoracic vertebra which was of about one-sixth normal width. The pedicles were seen to be much nearer to the pedicles of the fifth thoracic vertebra than normal. The trachea which was displaced considerably towards the right side in earlier films had returned to its normal position. The patient had experienced no pain after being placed in a plaster bed. X-ray examination on November 27 showed that the opacity in the superior mediastinum had disappeared. The most recent X-ray films, taken ten months after onset of the disease, showed only slight reactive new bone formation, and as yet there was no suggestion of bony ankylosis. At the time of the meeting the patient was still in his plaster bed and had regained his normal weight.

Dr. Woodland stated that this case illustrated that, in the early stage of acute pyogenic osteomyelitis of the thoracic spine, diagnosis was not difficult, but later, with the development of mediastinal suppuration and respiratory involvement, the primary lesion was entirely masked both clinically and radiologically by severe secondary respiratory complications. In this case there were X-ray signs suggestive of a mediastinal abscess which did not disappear for three months. On several occasions costo-transversectomy was contemplated, but the patient's general condition con-

tinued to improve and finally the probable mediastinal abscess completely absorbed. Dr. Woodland continued that he had observed a similar delay in bony ankylosis in cases of severe acute osteomyelitis of the vertebral bodies when, with the aid of penicillin, recovery from the acute phase had occurred. Prior to the use of modern chemotherapy, of course, most of these patients died, often without a diagnosis of their condition having been made; but patients with acute osteomyelitis who recovered showed early and marked reactive new bone formation. Another interesting feature in this case was that the fourth thoracic vertebra was situated almost immediately beneath the site of the carbuncle. Dr. Woodland questioned whether the osteomyelitis was caused by spread through local venous or lymphatic connexions, or whether the spread was embolic through the general circulation and the location merely a coincidence.

Dr. Woodland stated that pyogenic osteomyelitis of the spine was considerably more common than had been previously thought. In cases of acute osteomyelitis involving the thoracic spine, mediastinal suppuration usually caused pulmonary involvement which frequently caused an erroneous diagnosis to be made. The less acute type of osteomyelitis of the spine had in the past been frequently labelled "tuberculosis of the spine". In the early stages of the disease diagnosis rested on a history of severe backache, marked spasm of the sacrospinal muscles and leucocytosis. Localized tenderness appeared a little later; but once apparent it persisted. The first X-ray sign, which might not be seen for two months after the onset of symptoms, was a narrowing of the intervertebral space with a moth-eaten appearance of one or both vertebral bodies bounding the space. Even at an early stage there was an increased density of the affected vertebræ in contrast to the generalized decalcification evident in early tuberculosis. "Parrot's beaks" were usually seen within a few months, and complete bony ankylosis might occur as early as seven months from the onset of the disease.

Dysostosis of the Clavicle.

Dr. Woodland then presented a female baby, aged three months. The child had been born on February 19, 1947, after a normal confinement. On February 21 a deformity was noticed about the middle of the right clavicle. There was no bruising or swelling. The deformity was considered to be due to fracture through the middle of the clavicle. There was no history of bony crepitus. An X-ray examination made on February 21 showed that the medial half of the clavicle was separated from the outer half and displaced about one inch proximally. The lateral end of the medial half of the clavicle was rather sharply pointed, but the surface was smooth. The medial end of the outer half of the clavicle was broad with a smooth outline. The child was treated in a figure-of-eight bandage as for a fractured clavicle. Subsequent X-ray examinations showed no change in the position of the clavicular fragments and no evidence of callus formation.

About May 1 the child was referred to the Orthopædic Department, the problem being whether this was a case of ununited fracture of the clavicle or of dysostosis of the clavicle. X-ray investigation of the skull and the pelvis did not reveal any bony abnormality, such as was usually seen in cranio-cleido dysostosis. It was considered that the most likely diagnosis was that of dysostosis because of the absence of any callus formation which was usually so prolific following a fracture in a newborn baby.

Dr. Woodland stated that dysostosis of the clavicle was usually bilateral and was frequently associated with other congenital anomalies of the bone and soft tissue. Because in this case the dysostosis was unilateral and, if uncorrected, would later lead to asymmetry of the shoulder girdle, it was proposed when the child was about nine months old to operate in an endeavour to secure bony fusion between the two segments of the clavicle. In the more common bilateral type, operation was as a rule not indicated as function was not usually impaired.

Demonstration of X-Ray Films.

A series of X-ray films were shown by DR. J. A. VOTE and DR. C. D. BADHAM. The first film shown was that of the chest of a female, aged thirty-eight years, who some weeks before her admission to the Royal Prince Alfred Hospital had given birth to a baby at the Women's Hospital, Crown Street. A routine X-ray examination made at this hospital had been suggestive of Besnier-Boeck's sarcoidosis. Examination of a biopsy specimen from a lymph gland confirmed the diagnosis and the patient was referred to the Royal Prince Alfred Hospital. In the film shown there was a very considerable increase in the lung markings throughout both lung fields, except for the right subclavicular region which was curiously spared. The lung markings were of a coarse reticular pattern. There was no nodulation. There was no evidence of hilar glandular enlargement, which was often seen during the course of this disease. Films of the hands and feet did not show the osseous lesions which occasionally occurred in the disease.

The next films presented were from a histologically proved case of Besnier-Boeck's disease in a young female. The lung fields showed a uniform fine reticular pattern throughout, the appearance being like thick strands of a cobweb radiating out from the hilum to the periphery, branching freely during their outward course. The hilar and paratracheal glands were slightly enlarged. The films of the hands and feet of this patient were interesting as they showed the bony changes which were occasionally seen in this disease. In the metacarpals, metatarsals and phalanges there were small cystic areas in the bones, and the bony trabeculæ were much widened in the affected areas. It was pointed out that this bony manifestation of Besnier-Boeck's disease was often termed *osteitis tuberculosa multiplex cystica* and occurred in rather less than 10% of cases of the disease.

Dr. Vote and Dr. Badham then showed a film of the chest of a patient who had later died of miliary tuberculosis. The patient was a female, aged fifteen years, who had been admitted to the Royal Prince Alfred Hospital and died a few weeks after admission. The film showed the lung fields to be uniformly studded by innumerable dots of opacity about the size of a pin's head. At autopsy the pathological findings were in accord with the previous radiological findings.

The next film presented was that of the chest of a male patient, aged forty-two years, who had had mitral stenosis for many years. The film of the chest showed the shape of the cardiac shadow to be quite consistent with a mitral lesion. The aortic knuckle was hypoplastic, the pulmonary conus prominent, and a pear-shaped opacity could just be made out lying within the cardiac shadow with its base overlying the upper part of the right auricle. This represented the enlarged left auricle. The interesting feature in this film, however, was a nodular, almost miliary appearance in the lung fields. This was due to swollen vessels seen end on and alveoli filled with "heart failure cells". This appearance was seen occasionally in cases of mitral stenosis and could be remarkably like pneumonokoniosis or miliary tuberculosis.

Dr. Vote and Dr. Badham then showed films of a patient who had three gastric ulcers situated on the lesser curvature of the stomach. The patient, a woman, aged thirty-eight years, had suffered severe postprandial pain for two years before the examination. Vomiting occasionally occurred after meals and this relieved the pain. X-ray examination following a barium meal showed a rather hypotonic stomach; within a length of three inches about the middle of the lesser curvature side of the stomach there were three gastric ulcers, the highest having a rather V-shaped appearance which suggested that healing was taking place. Several films of this were shown.

The last film was that of a dermoid cyst situated in the pelvis and diagnosed radiologically. The patient, a married woman, aged twenty-seven years, had been attending the ante-natal clinic at the King George V Hospital, where a cystic mass was found on the left side of the pelvis during routine vaginal examination. She was referred for an X-ray examination of the pelvis which showed a tooth embedded in a small piece of bone lying in the left side of the true bony pelvis. Dr. G. Maitland had reported that the lesion was a dermoid cyst containing a tooth. At operation the dermoid was removed.

Laryngeal Carcinoma.

DR. P. D. BRADDON, in association with DR. A. O. DAVY, showed four patients who had had laryngeal carcinoma treated by a new technique devised by Dr. Braddon. By means of a large fenestration in the thyreoid cartilage, centred over the vocal cord, a silver ring with a diameter of 2·0 centimetres containing radon had been inserted. In cases in which there was involvement of the arytenoid, or infraglottic region, the homogeneous dosage delivered by the ring was extended backward and/or downward by a segmental row of radon seeds implanted beyond the ring. In the case of one patient who had both cords involved and visible infraglottic extension, both sides of the larynx had been treated similarly, and the effective area of dosage on both sides extended downwards and backwards by seed implantation. No trouble had been experienced, either immediately with œdema of the glottis, or remotely with perichondritis or necrosis of cartilage. Tracheotomy had not been performed. As a result of the experience gained it was found advisable to give a dose of 6,700*r* (at half a centimetre distance) over nine days. The rings were readily removed by opening up the neck wound under local anæs-

thesia. Ten months had elapsed since the first patient was treated, and five months since the latest. On examination there remained no sign of carcinoma in the larynx or neck and three of the patients had excellent voices. The fourth patient had had a hoarse and croaky voice for many years before he developed carcinoma, and he stated that his voice was normal for him. At least three of these patients were beyond the scope of laryngofissure with surgical removal of one cord. The tumour in all these four cases was squamous-cell carcinoma of the larynx, proven by biopsy.

Dumb-Bell Tumour (Neurofibroma) of the Spinal Cord.

DR. R. A. MONEY presented a male patient, aged forty-nine years, a machinist, who had been referred from the Saint George District Hospital by Dr. K. S. Harrison and Dr. E. F. Figtree. The patient had complained of numbness of the left great toe for seven months and a hot tight feeling around the left calf for six months, this being replaced later by a numb feeling and weakness of the left leg for six months. He had been referred to the Saint George District Hospital and treated with deep X-ray therapy for eleven weeks. Then for four weeks he had experienced numbness of the left thigh and foot drop of the left foot, pains across the lower lumbar region and difficulty with walking. It was notable that he had not experienced any pains of spinal nerve root origin. When first seen by Dr. Money the patient had been walking with a stick and had stiffness of the left leg; there were marked rigidity of both legs, weakness of the muscles of the left leg with slight wasting of the left calf. Incoordination was demonstrated with heel-knee-shin tests. Pain sensation was diminished over the front of both legs and the back of both legs and thighs. Temperature sense was diminished over the front of both legs. All sensations became sharp above the inguinal ligaments. All tendon reflexes were exaggerated; both plantar responses were extensor. At lumbar puncture a slightly yellow fluid was obtained under a pressure of 120 millimetres of fluid. The response to the Queckenstedt test was normal. The globulin content of the cerebro-spinal fluid was increased, the total protein content being 35 milligrammes *per centum*. The report received after X-ray examination of the thoracic spine stated that mild scoliosis and kyphosis with early spondylitis were present, but closer inspection of the films subsequently revealed erosion of half the pedicle of the ninth thoracic vertebra on the left side. Following lumbar puncture weakness developed in both legs, so that the patient could scarcely move them. Myelography with "Lipiodol" revealed that most of the medium was arrested in the mid-thoracic region and had deviated to the right side during descent. A laminectomy was performed, and at operation an extramedullary tumour about the size of a cherry was found intradurally, compressing the cord from the left side at the level of the ninth thoracic vertebra. The tumour grew out along the ninth spinal nerve root through the dura and this portion of the tumour was removed extradurally as it passed into the intervertebral foramen. Silver clips were left on the distal end of the nerve in this foramen. Microscopic examination revealed a tumour which consisted of elongated cells and interlacing strands having a palisade arrangement; this was typical of a neurofibroma or Schwannoma. The patient's convalescence was uneventful and he left hospital four weeks later able to walk without assistance and with his sensations reappearing, though his gait was still spastic. Prior to his discharge lumbar puncture yielded clear fluid without any increase of protein or globulin; the results of the Queckenstedt tests were normal. The patient's walking was still improving. The prognosis was good. Dr. Money remarked that the chief features of interest in the case were, firstly, the complete absence of root pains and of any girdle sensation, and, secondly, the marked erosion by pressure of the pedicle of the ninth thoracic vertebra; this had demonstrated the level of the tumour.

Herniated Nucleus Pulposus.

Dr. Money's second patient was a male, aged thirty-six years, a furniture removalist, who had been referred from the Marrickville Hospital. When first seen the patient complained that for three months he had had stabbing pains in the lower lumbar region on lifting weights. Five weeks before he was seen, when lifting a refrigerator, he had experienced violent pain across the lower lumbar region spreading down the right hip and the anterior aspect of the right thigh to the knee. For four weeks he had had weakness in the right thigh and had been walking with a limp and for two weeks he had been unable to support himself on the right leg alone. The pains were aggravated by coughing and sneezing. On examination a slight dorso-lumbar scoliosis was found. There was weakness of the quadriceps muscle of the right thigh with wasting to the extent of two centimetres in circumference. All movements of the spine were carried out fully. Lasègue's sign was not present. The right knee jerk was absent; fibrillary twitchings were noted in the anterior group of muscles of the right thigh. Plain X-ray films showed no abnormality except spondylitis involving the fifth lumbar vertebra. A lumbar puncture in the fifth intervertebral space yielded fluid under normal pressure; the results of the Queckenstedt tests were normal; the globulin content was increased, the total protein content being 50 milligrammes *per centum*. Myelography was not performed. At operation the lamina of the fourth lumbar vertebra and the adjoining *ligamentum flavum* were removed. Herniation of the *nucleus pulposus* from the disk between the third and fourth lumbar vertebræ on the right side was found and removed by means of a pituitary rongeur. The remainder of the degenerated and necrotic disk was curetted out. Microscopic examination of the tissue removed showed degenerated *nucleus pulposus*. The patient's convalescence was satisfactory. He was discharged from hospital three weeks after operation and resumed full-time work two months later. He had continued to be free from pain since and did everything except carry pianos. Dr. Money's comment on the case was that it showed herniation of a *nucleus pulposus* at a higher level than usual, which revealed itself by the absence of a knee jerk.

The third patient presented by Dr. Money was a male, aged thirty-eight years, a country labourer, who had been referred by Dr. Solomon, of Mittagong. When first seen the patient complained of pain in the left hip for two months; this extended down the posterior aspect of the left calf and leg. He had also weakness of the left foot and dragging of the toes. On examination no organic weakness or wasting was detected, slight lumbar scoliosis was present with convexity of the right, the ankle jerks were weak on the left side, and Lasègue's sign was present on the left side. Lumbar puncture yielded clear fluid at a pressure of 160 millimetres of fluid, the results of Queckenstedt tests were positive, and the globulin and protein contents were not increased. Examination of the lumbo-sacral spine by plain X-ray films revealed no abnormality. At operation a hemi-laminectomy of the fourth and fifth lumbar vertebræ was performed with removal of the *ligamentum flavum* between the vertebræ. The nerve roots of the fifth lumbar and first sacral nerves were found to be swollen. A herniated *nucleus pulposus* was revealed on the left side from the disk between the fourth and fifth lumbar vertebræ, the fifth lumbar nerve root being stretched over the top of it. The herniated portion of the disk was removed. Microscopic examination revealed that this tissue was degenerated *nucleus pulposus*. The patient's convalescence was satisfactory except for discharge of xanthochromic fluid from the wound ten days after operation. The patient was discharged from hospital one month after operation. He resumed full-time employment three months after operation and had continued since. His work included felling timber. The notable feature about the case, Dr. Money remarked, was that, despite the short length of the history, considerable herniation of the degenerated *nucleus pulposus* had occurred.

Dr. Money's fourth patient was a male, aged fifty-three years, who had been referred by Dr. E. H. Friedman, of Auburn, and Dr. Eric Fisher. He had complained that for ten years he had experienced pains in the left lumbar region extending down the left buttock and the left leg as far as the calf. For three months he had had acute "sciatica" down the left side and inability to bend forward. For two months he had been walking awkwardly with a limp and had experienced tingling and numbness in the sole of the left foot. On examination some weakness was found in all movements of the left lower extremity with marked limitation of all movements of the spine, especially flexion. Lumbar lordosis was completely obliterated. Great shortening of the hamstring muscles was present with inability to reach the knees on attempting forward flexion. Lasègue's sign was present. The left ankle jerk was absent. Examination of the lumbo-sacral region of the spine by plain X-ray film revealed no abnormality. Myelography after injection of "Pantopaque" showed typical deformity, mainly notching in the column of opaque medium at the level of the disk between the fifth lumbar and first sacral vertebræ on the left side. At operation the left half of the lamina of the fifth lumbar vertebra and the *ligamentum flavum* between the fifth lumbar and first sacral vertebræ were removed. A small encapsulated herniation of portion of the *nucleus pulposus* was found protruding backwards from the left side of the disk between the fifth lumbar and first sacral vertebræ. The fifth lumbar and first sacral nerve roots were stretched tightly over this protrusion. The herniated *nucleus pulposus* was removed by means of a pituitary rongeur. Microscopic examination of the tissue

revealed degenerated cartilaginous tissue with necrosis and œdema. The convalescence was uneventful; the patient was discharged from hospital three weeks after operation and had since then resumed full duty and was free from pain. Dr. Money considered that the length of history in this patient's case and the extreme degree of disability prior to operation should be specially noted.

Dr. Money's last patient was a male, aged thirty-five years, a carrier, who had been a patient of Dr. McClements Callow. When first seen by Dr. Money the patient had complained of pains in the lower part of the back for thirteen years. These occurred after lifting weights and spread down the back of the left leg. For one year he had had a feeling of weakness in the left leg. A plaster jacket had been applied for a period of three months, but without result. On examination it was noted that the patient stood with his left lower limb slightly flexed, and some weakness of the left lower limb was present with wasting of the muscles of the thigh and leg. He had marked limitation in flexion of the spine and was unable to touch his knees when his legs were kept straight. The normal lumbar curve was completely obliterated. The hamstring muscles were greatly shortened. Lasègue's sign was present, being greater on the left side than on the right. The left ankle jerk was very much diminished. Compression of the jugular veins reproduced the pains which extended down the left lower limb (Naffziger's sign). Sensation was unaltered. Examination of the lumbo-sacral spine by plain X-ray film revealed no abnormality. A provisional diagnosis of herniation of the *nucleus pulposus* between the fourth and fifth lumbar vertebræ was made on the basis of the history and physical signs and laminectomy was recommended if no abnormality was found at the level suggested. The disk between the fifth lumbar and first sacral vertebræ would be explored.

(To be continued.)

Correspondence.

A DISCLAIMER.

SIR: I would be glad if you would publish the following disclaimer in the journal.

I have been shown a circular letter (undated) which has been issued under the printed heading of the Medical Committee of the Victorian Branch of the Australian Communist Party, 49, Elizabeth Street, Melbourne, and signed by its secretary. In this letter it is stated that the new free medical service to be introduced by the Labour Government is, as Dr. Victor Hurley has said, "in accordance with a world trend and cannot be 'bucked' ".

I wish emphatically to deny that any such statement, or anything which could be interpreted as having this meaning, has ever been made by me.

I have written an emphatic denial to the signatory of the letter and have requested him to refrain from any further distribution of the circular and also from any further misuse of my name by him.

Yours, etc.,

14, Parliament Place, Melbourne, Victoria.
August 14, 1947.

VICTOR HURLEY.

CRIMINAL RESPONSIBILITY.

SIR: The addresses by Dr. W. E. Audley and Dr. E. P. Dark on "Criminal Responsibility" with the subsequent discussion afford great scope for philosophical study of a problem which presents infinite difficulties.

Many of the statements made and apparently considered to be factual are merely expressions of personal opinions. Dr. Dark states that "investigations showed that of those from the inner suburbs 31·6% were below normal intelligence, from the outer suburbs 46·2%, and from the country 65%". Taking this with other given figures, it would appear that the higher the intelligence the greater the criminal or delinquent propensity. However, I think it quite reasonable to assume that the figures in relation to "normal intelligence" indicate either a failure to appreciate the implications of the word "intelligence" or a very unreliable means of estimating "intelligence".

It is a present-day obsession to decry the prevalence of sex crimes and to deplore the lack of sex education. What a farce this is! What is meant by sex education? The problem is one of much wider and greater importance, of which "sex crimes" are merely one small feature. In public and private life and activities the predominance of self-interest, both of the individual and of the class, is paramount. In all walks of life, in matters of private and of public interest, the motive of self-interest is predominant. When, if ever, mankind learns to subjugate this matter of self-interest, both as individuals and as classes, and to consider and work for the well-being of his fellows, to rid himself of prejudices, to listen to reason, then and only then will the incidence of sex and other crimes be reasonably reduced.

Yours, etc.,

Ballow Chambers, Wickham Terrace, Brisbane.
August 15, 1947.

ERNEST CULPIN.

SIR: Dr. Dark's belief that "men do not stop to think what will be the punishment if I am caught" and that severe punishment does not act as a deterrent to crime is negatived in my mind by hard facts within my personal knowledge. Years ago I had close contact with many men who frankly acknowledged that it was only fear of flogging that cramped their style in seeking feminine favours. They were of poor type and, though constantly employed, their earnings were poor. But their knowledge of legal floggings in the eastern States and of the judges concerned was complete and dated back for several years. None of them were criminals, nor so far as I know did they ever become so. This class of men does not get into statistical tables; nevertheless it exists, and I have no doubt still "tapes" the legal floggings and birchings, and is still terrified into good behaviour by them.

Yours, etc.,

St. Kilda, Victoria,
August 18, 1947.

C. A. COURTNEY.

Obituary.

EDWARD THOMAS THRING.

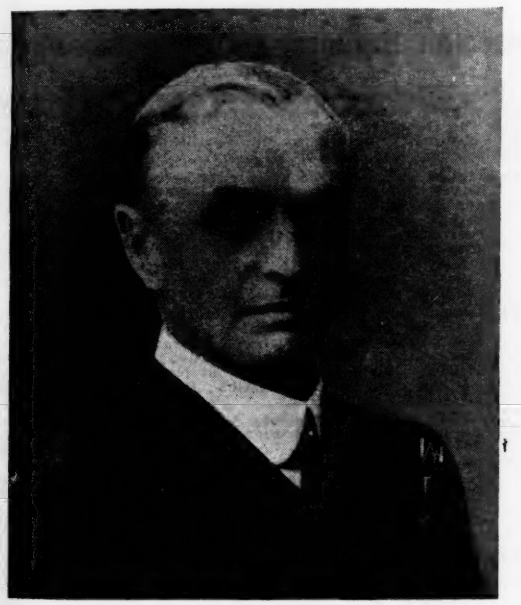
WE are indebted to Dr. H. H. Schlink for the following account of the career of the late Dr. Edward Thomas Thring.

On July 11, 1947, Sydney lost one of its most prominent pioneer surgeons, the late Mr. Edward Thomas Thring. Few men have rendered such long and meritorious service to the citizens of this city, State and country. After a brilliant medical course at University College Hospital he obtained his M.R.C.S., 1882, L.R.C.P., 1883, and at an early age he obtained the coveted Fellowship of the Royal College of Surgeons of England in 1885. He won the Atkinson Morley Scholarship in Surgery at the University College Hospital, and was the first holder of the research scholarship in medicine given by the Society of Apothecaries, England.

He was probably among the first English Fellows to migrate to Australia, where he arrived in 1886 and entered into partnership with Dr. Collingwood and Mr. Twynam at Petersham, Sydney. He soon secured a position as honorary surgeon on the staff of the Lewisham Hospital, which he served for six years, and gave up general practice in 1890 to specialize in gynæcology in Macquarie Street. As a matter of interest Thring never liked to be called a gynæcologist, but preferred to be known as an abdominal surgeon, in which area he was equally at home in the upper and lower portions. In 1889 he joined the staff of the Prince Alfred Hospital as an honorary assistant gynæcological surgeon and served that institution for a total period of 58 years. He became a senior in 1897 and an honorary consultant in 1915. In this year he joined the Royal Army Medical Corps as a major and later transferred to the Australian Army Medical Corps in 1917 in France.

Thring was probably one of the most brilliant technical surgeons of his period. Well versed in the medical literature of the day and with a sound practical knowledge of anatomy, he developed an operative technique which was the envy of his colleagues and the pride of his assistants and students. With a clear logical brain and a methodical, constant, never-changing approach to the surgical problems before him he became one of the most brilliant imparters of surgical knowledge in the University of Sydney. Such men as Professor Watson, of Adelaide, and M. U. O'Sullivan, of Melbourne, never missed being in his theatre when in

Sydney, and the first time I met Victor Bonney, of London, he immediately spoke about that brilliant surgeon Thring, of Sydney. In those days most gynæcological surgeons drained the abdomen either through the wound or *per vaginam*. Thring was one of the first to discard these unnecessary procedures, relying on the protective qualities of the peritoneum itself. I think it was his strong advocacy of this now proven procedure that impressed Bonney and the London surgeons. He was a great admirer of Howard Kelly, of Baltimore, and fashioned his technique on that world-famous and creative gynæcological or abdominal surgeon. He often told me that he never let a day pass without reading twenty pages of Kelly's famous textbook which the artist Max Brödel did so much to popularize by his exquisite anatomical drawings. In regard to Kelly it is interesting to record that in the year Thring was made a senior surgeon at Prince Alfred Hospital, 1897, Kelly at the age of twenty-eight and Doyen, of Paris, whose age I do not know, performed the first two hysterectomies ever carried out at Edinburgh Infirmary, all of which goes to show how modern the art of abdominal surgery is. It is just possible that Thring and his senior Foreman were doing hysterectomies



at Prince Alfred Hospital in Sydney before one was ever attempted in that most famous Scottish centre of medical education.

Thring as a man was peppery and did not suffer fools gladly, but under a fiery and caustic exterior lay a heart of kindliness and a desire to advance the particular art which was his life's work. He was hard on his assistants, but fair and just. He was so enthusiastic and intent on reaching the 100% ideal in his operative work that I am certain that he was quite unconscious of his scathing attacks on the clumsiness and inefficiency of his assistants. I know one meek and mild resident medical officer who could never eat his dinner in mess after his afternoon with Teddie. Myself, I asked my superintendent and the late Dr. St. John Dansey what would happen to me if I had a smack at him. The prompt reply "sack" did not prevent me a few days later from contemplating how I would do it, when I was disarmed by the great man offering me a cigar of peace. As we smoked together over a cup of coffee I realized what a privilege it was to be associated with such a wonderful workman and how he was really teaching me surgery of the highest class, a course of training that money could not procure in any part of the known world. I believe that all his contacts felt the same way about this small, logical, hardworking and (when not in the theatre) cheerful, intelligent, enthusiastic and charming personality, commonly known (when not present) as Teddie.

Thring did a great service to the surgery of this city, and that this State has so many good operating doctors is largely due to his tuition and keenness. He with his senior and junior colleagues, Foreman, Taylor Young and Barrington, built a school of gynæcology in the University of Sydney second to none overseas as I personally discovered on several post-graduate tours of Europe and America.

Thring was not only a good surgeon but a man interested in literature, the arts, public affairs and sport. He was one of the best swordsmen in New South Wales, a good horseman and a general athlete. He was on the Board of the Bank of New South Wales, was the founder and first president of the Australian Massage Association, the president of the Australasian Trained Nurses Association, and a foundation Fellow of the Royal Australasian College of Surgeons. He was an expert gardener and was interested in rural properties and a colossal reader. Anyone looking into the library of his club, the Australian Club, would more often than not find Thring with his nose in books that the common reader rarely opened.

Edward Thring had a very full life and has left the state of surgery better than he found it. He was respected and admired by all his colleagues at Royal Prince Alfred Hospital, where he spent the greater part of his professional life attending to the sick and poor of the whole State. That was not the only public institution which benefited by his knowledge. As I have stated, he spent six years as senior surgeon at the Lewisham Hospital. He gave ten years' service to what was then known as the Coast Hospital, now the Prince Henry. He was an honorary medical officer to the Infants' Home, Ashfield, and surgeon to the Royal Hospital for Women, Paddington. In addition he found time to be Honorary Secretary to the New South Wales Branch of the British Medical Association and later its President.

All at the Royal Prince Alfred Hospital genuinely miss his stimulating personality and all mourn with his wife and relatives a real loss to our hospital and community.

LILIAN VIOLET COOPER.

WE regret to announce the death of Dr. Lilian Violet cooper, which occurred on August 18, 1947, at Brisbane.

Research.

ALAN JOHNSTON, LAWRENCE AND MOSELEY RESEARCH FELLOWSHIP.

APPLICATIONS are invited by the Council of the Royal Society for the Alan Johnston, Lawrence and Moseley Research Fellowship into the problems of human and animal health and diseases and the biological field related thereto. The Fellowship will be tenable at any place approved by the Council of the Royal Society. Candidates should supply the usual personal details and give the names of two referees. Testimonials will not be considered. Applicants and referees at a distance may write direct to the address given below, without first obtaining forms. The subject of the proposed research and the place at which it would be carried out, together with the name of the head of the department, should be given.

The appointment will be for two years in the first instance, from January 1, 1948, and will be renewable up to a maximum of five years. It will be subject to the conditions governing Royal Society research appointments. The stipend will be £850 *per annum*, with superannuation benefits to which the successful candidate will be required to contribute 5% of annual stipend and to which the society will make a contribution of 10%.

Applications should be made on forms to be obtained from the Assistant Secretary, the Royal Society, Burlington House, London, W.1, and should be received as early as possible, in any case not later than November 1, 1947.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Wiles, Helen Booth, M.B., B.S., 1946 (Univ. Sydney), 15, Wharf Road, Gladesville.

Brown, Thomas Frederick, M.R.C.S., 1909 (England), L.R.C.P., 1909 (London), D.P.H., 1918 (London), 10, Church Street, Randwick.

Roarty, John Stanislaus, provisional registration, 1947 (Univ. Sydney), 61, Greengate Road, Killara.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Chard, June Myra, M.B., B.S., 1947 (Univ. Adelaide), 30, Bolingbroke Street, Toorak Gardens.

McCann, Ralph Newton, M.B., B.S., 1946 (Univ. Adelaide), 52, Tusmore Avenue Tusmore.

Rosenberg, Mendle Wolf, M.B., B.S., 1942 (Univ. Adelaide), McLaren Vale.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association:

Wurm, Roger Sinclair, M.B., B.S., 1947 (Univ. Adelaide), 80, Main North Road, Prospect.

Ellis, Howard John, M.B., B.S., 1946 (Univ. Adelaide), 30, Marlborough Street, Brighton.

Tippelt, Ferdinand Marcel, M.B., B.S., 1942 (Univ. Adelaide), Quorn.

The undermentioned has applied for election as a member of the Tasmanian Branch of the British Medical Association:

Murphy, Edward Joseph, M.B., B.Ch., B.A.O. (N.U.I.), Evandale.

Notice.

THE ROYAL MELBOURNE HOSPITAL OLD STUDENTS' ASSOCIATION.

A MEETING of the Royal Melbourne Hospital Old Students' Association will be held on Tuesday, September 16, 1947, at 8.15 o'clock p.m., at which Professor F. M. Burnet will deliver an address entitled "Virus Work at the Hall Institute". All members of the British Medical Association are invited to be present. The meeting will be held at the Royal Melbourne Hospital in the Lecture Theatre on the ground floor (access through casualty entrance).

Medical Appointments.

Dr. H. F. Hustler has been appointed honorary medical officer to the female venereal diseases clinic and honorary clinical assistant to the gynæcological section of the Royal Adelaide Hospital, Adelaide.

Dr. M. A. Radcliffe-Taylor has been appointed medical officer of health to the Brookton Road Board, Western Australia.

Dr. N. Kerkenezov has been appointed government medical officer at Woodburn, New South Wales.

Dr. J. I. Tonge has been appointed medical officer, Laboratory of Microbiology and Pathology, Department of Health and Home Affairs, pursuant to the provisions of *The Public Service Acts*, 1922 to 1945, and *The Health Acts*, 1937 to 1946, of Queensland.

Books Received.

"Notes on Clinical Laboratory Methods", by the Standing Committee on Laboratory Methods, University of Glasgow; Fifth Edition revised; 1947. Glasgow: John Smith and Son (Glasgow), Limited. 7¼" × 5", pp. 96. Price: 3s. 6d.

"The 1946 Year Book of Industrial and Orthopedic Surgery", edited by Charles F. Painter, M.D.; 1947. Chicago: The Year Book Publishers, Incorporated. 7" × 4½", pp. 432, with many illustrations. Price: $3.75.

"The 1946 Year Book of Dermatology and Syphilology", edited by Marion B. Sulzberger, M.D., assistant editor, Rudolf L. Baer, M.D.; 1947. Chicago: The Year Book Publishers, Incorporated. 7" × 4½", pp. 638, with many illustrations. Price: $3.75.

"The Essentials of Materia Medica, Pharmacology and Therapeutics", by R. H. Micks, M.D. (Dublin), F.R.C.P.I.; Fourth Edition; 1947. London: J. and A. Churchill, Limited. 8" × 5¼", pp. 410. Price: 18s.

"Recent Advances in Endocrinology", by A. T. Cameron, C.M.G., M.A., D.Sc. (Edinburgh), F.R.I.C., F.R.S.C.; Sixth Edition; 1947. London: J. and A. Churchill, Limited. 8" × 5¼", pp. 452, with many illustrations. Price: 21s.

"Textbook of Surgical Treatment Including Operative Surgery", edited by C. F. W. Illingworth, C.B.E., M.D., Ch.M., F.R.C.S.E.; Third Edition; 1947. Edinburgh: E. and S. Livingstone, Limited. 9½" × 6", pp. 656, with many illustrations. Price: 32s. 6d.

"The Childbearing Years", by C. Scott Russell, M.A., F.R.C.S. (Edinburgh), M.R.C.O.G.; 1947. Oxford: Blackwell Scientific Publications. 8½" × 5½", pp. 96, with many illustrations. Price: 7s. 6d.

Diary for the Month.

SEPT. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.

SEPT. 3.—Western Australian Branch, B.M.A.: Council Meeting.

SEPT. 3.—Victorian Branch, B.M.A.: Branch Meeting.

SEPT. 4.—South Australian Branch, B.M.A.: Council Meeting.

SEPT. 4.—New South Wales Branch, B.M.A.: Special Groups Committee.

SEPT. 5.—Queensland Branch, B.M.A.: Branch Meeting (Jackson Lecture).

SEPT. 9.—Tasmanian Branch, B.M.A.: Ordinary Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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